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THIS ANNUAL ASSESSMENT OF NORTH BOUNDARY SYSTEM OPERATIONS IS A COMBINED EFFORT OF THE TREATMENT TECHNOLOGY AND CONTAMINATION MIGRATION BRANCHES OF THE ENVIRONMENTAL DIVISION AND REPRESENTS AN UP-TO-DATE APPRAISAL AND ANALYSIS OF SYSTEM OPERATIONS FOR THE FISCAL YEAR. AN ATTEMPT IS ALSO MADE TO UPDATE AND SUMMARIZE THE BASE LINE GEOCHEMICAL AND HYDROLOGICAL CHARACTERISTICS OF THE SYSTEM HIGHLIGHT TRENDS WHICH MAY AFFECT FUTURE OPERATIONS. MAJOR HIGHLIGHTS OF THIS FISCAL YEAR OPERATIONS INCLUDED SURVIVAL OF THE FIFTY YEAR FLOOD, THE INSTALLATION OF LATCHES ON THE WELL INCLOSURES, AND THE OBSERVANCE OF STEADY STATE OPERATIONS OF THE SYSTEM. THIS REPORT WILL ATTEMPT TO OUTLINE THE MAJOR PERFORMANCE CHARACTERISTICS OF THE SYSTEM.

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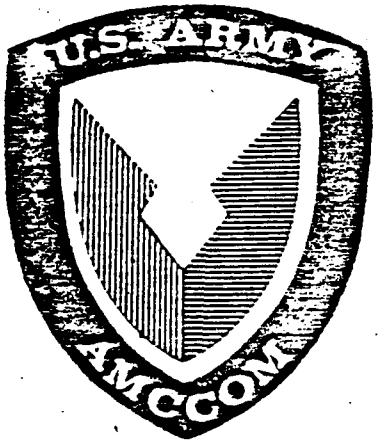
ANNUAL ASSESSMENT

NORTH BOUNDARY CONTAINMENT

TREATMENT SYSTEM

FY '83



Rocky Mountain Arsenal

October 1983

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TO Chief, Environmental Division FROM Chief, Treatment Technology Branch DATE 18 November 1983 CMT 1 C. Loven/vi/126

Enclosed for your review and distribution is subject report. This copy should be considered a "draft" and its expeditious release without Appendix A is intended to preview potential FY 84 program activities.

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CARL G. LOVEN
Chief, Treatment Technology
Branch

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TABLE OF CONTENTS

SUMMARY

This Annual Assessment of North Boundary system operations is a combined effort of the Treatment Technology and Contamination Migration Branches of the Environmental Division and represents an up-to-date appraisal and analysis of system operations for the fiscal year. An attempt is also made to update and summarize the base line geochemical and hydrological characteristics of the system and highlight trends which may effect future operations.

Major highlights of this fiscal year operations included survival of the 50 year flood, the installation of latches on the well inclosures, and the observance of steady state operations of the system. This report will attempt to outline the major performance characteristics of the system.

DISCUSSION

GEOCHEMICAL

Geochemical conditions, as defined by the measurement of selected inorganic and organic containments in the ground water, are represented by (1) plume maps which historically track the movement of various contaminants from section 26 in the vicinity of Basin F through section 23 to the north boundary of the Arsenal and (2) a cross section of contaminant concentration along the dewatering well line. The overall correlation between these measurements continues to be excellent thereby adding credibility to the values presented and a high degree of confidence to the predication of future trends in contaminant movement and concentrations in the north boundary region.

Figures 1-6 depict the cross section of contaminant concentrations for selected species along the dewatering well line. Data for their plots is obtained by sampling individual pump wells as compared to monitoring well data used to construct the contaminant plume maps.

The contamination plume maps (Figs 7-10) using 1983 data to update previous maps, show a high degree of correlation with the values obtained along the dewatering well line. The 1983 data shows a more defined delineation of contaminant migration from the northeast corner of Basin F to the north boundary. Compared to earlier data, the flow patterns and migration routes of a number of compounds appear more readily apparent with less interference caused by historical events which tend to interfer with the interpretation of source migration.

Although the general trend of contamination levels appears to be fairly steady, it is apparent a plume of higher contaminant concentration is approaching the north boundary. The chloride and DIMP plume maps show the most dramatic examples of this "new wave".

In general, the valves used to establish the concentration plots in the case of the dewatering wells and the contours in the case of the plume maps represent averaged or normalized values over the sampling period for each compound. In some cases, data from both sources were used in an effort to increase the data base and provide confirmatory information. The following is a discussion of observations made from the monitoring and dewatering well data for specific compounds.

Fluoride. Historically, fluoride has been one of the most predictable and consistent compounds to track. The overall fluoride concentrations have been relatively consistent since 1978. The pattern of high fluoride to the west, and low concentrations to the east is shown in Figure 1. Only the "C" portion of the dewatering line has fluoride below standards as seen in Figure 10 where background levels in excess of 2 ppm are evident.

Chloride. Chloride is not normally measured in the dewatering wells, however, as shown in Figure 9, the prominence of chloride contamination eminating from the Basin F area is quite evident. Chloride values of 18,000

and 10,000 ppm are detected in sections 26 and 23, respectively. The chloride plume is quite defined and is progressing towards the north boundary at a consistent rate.

DIMP. DIMP is the most prevelant widespread organic contaminant in the North Boundary system. There have been no major changes in the DIMP concentrations since 1979. Figure 7 shows an extension of the 1,500 ppb contour to the dewatering system. Both A and B lines have extensive DIMP contamination with the maximum values coinciding with the plume contour in the vicinity of the pilot containment system (Fig 2).

OXAT & DITH. The sum of these compounds are plotted (Fig 3) since they appear together and are chemically similar. Relatively low levels (above detectable) are seen consistently in wells in the "A" section.

CL^- Sulfurs. These compounds are also plotted together since they differ from each other only in oxidation state. Figure 4 shows clearly the prominence of the compounds along the "B" section. This migration pattern is east of the classic chloride, DIMP pattern and coincides with the movement of DCPD and DBCP.

DBCP. Concentrations of DBCP (Fig 5) like the CL^-S compounds are above detectable levels in the midsection of the system. Levels as high as 20 ppb are detectable in a well defined plume (Fig 8) extending from the northeast of Basin F to a section of the boundary opposite the bog. This plume is of particular concern because of the very low detectable limits and treatment standards.

DCPD. Similar to the previous two compounds discussed appears above detectable levels in the midsection of the system but slightly to the west of the DBCP plume. DCPD has been detected in similar concentrations since investigations began. Comparative values are somewhat questionable because of the difficulty with analytical consistence.

Fluoride Average [1982-1983]

Army

vs. Alluvial Wells

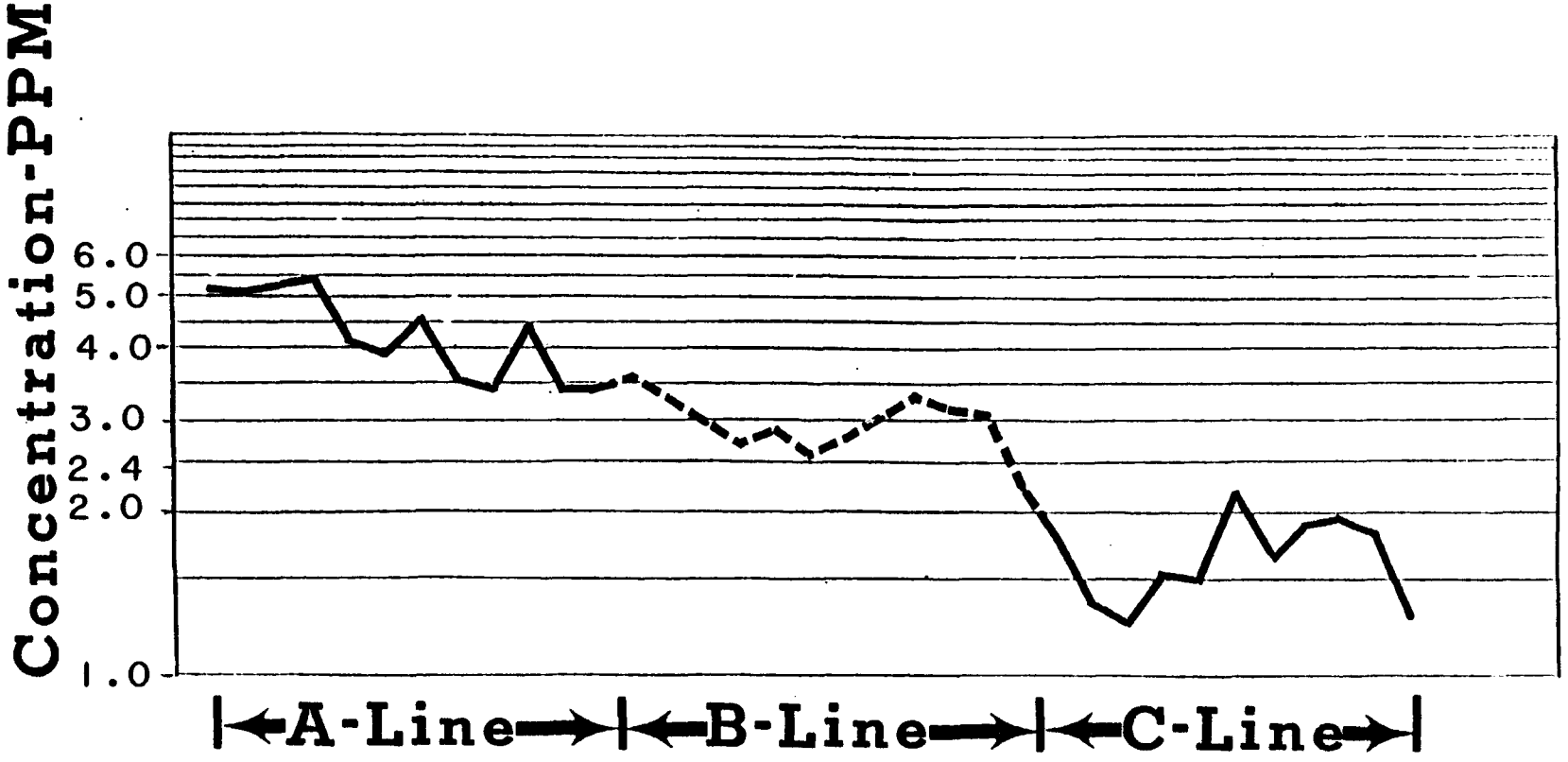
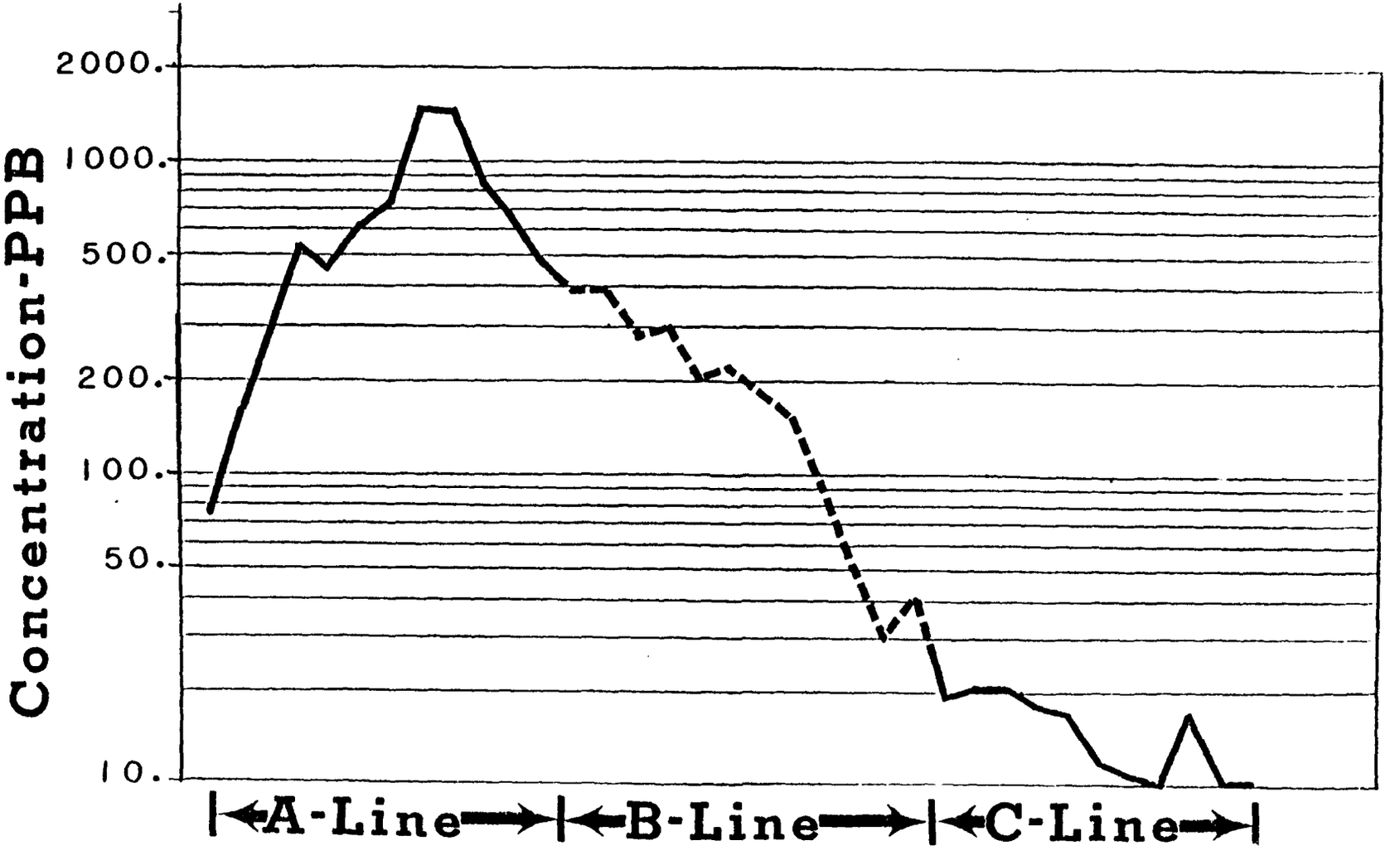


Figure 1

DIMP Averaged [1981-1983]

vs. Alluvial Wells



Sum[Oxat.&Dith.] Averaged [1982-1983]

vs. Alluvial Wells

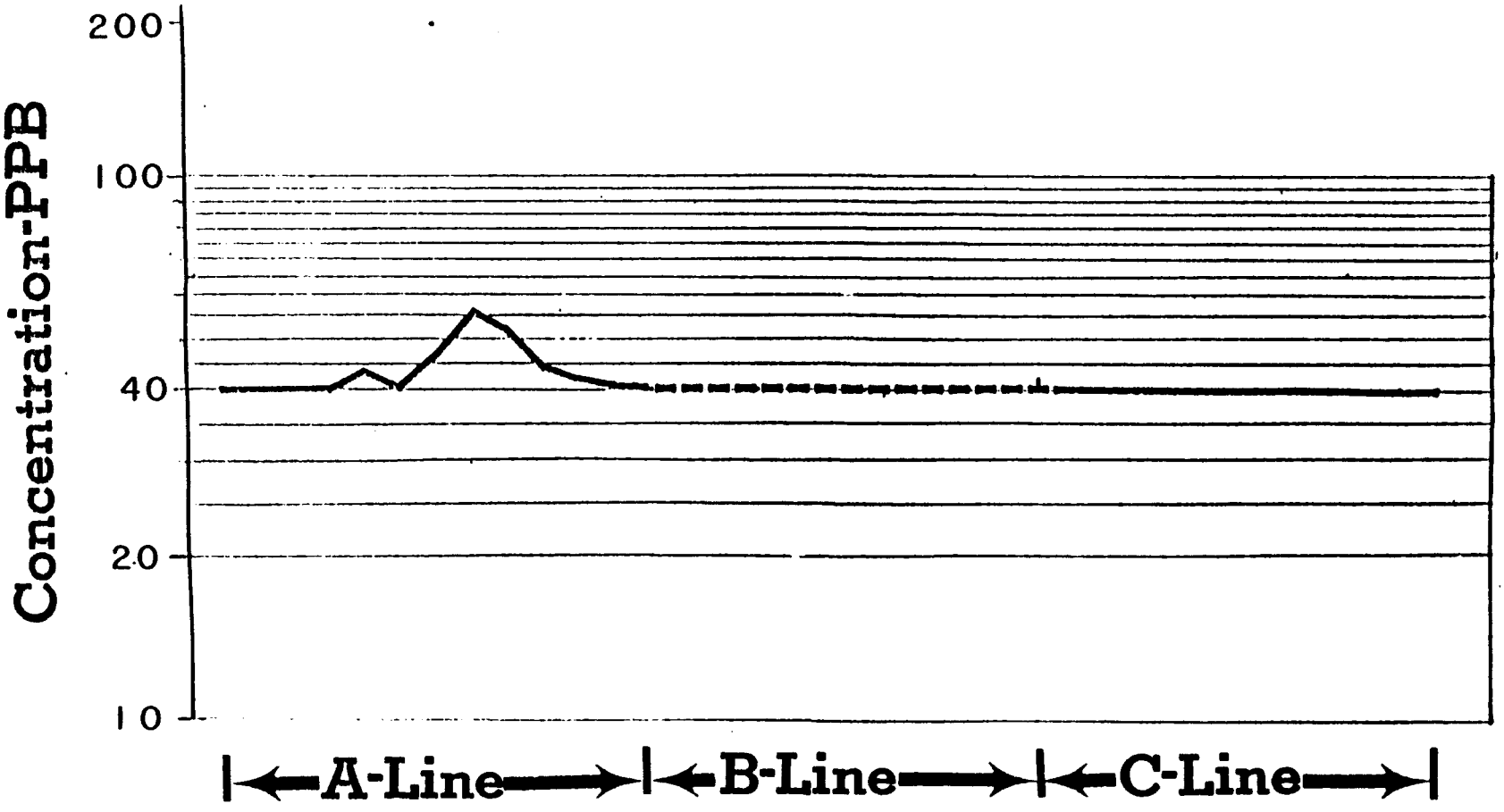


Figure 3

Sum Cl-Sulfurs Averaged [1981-1983]
vs. Alluvial Wells

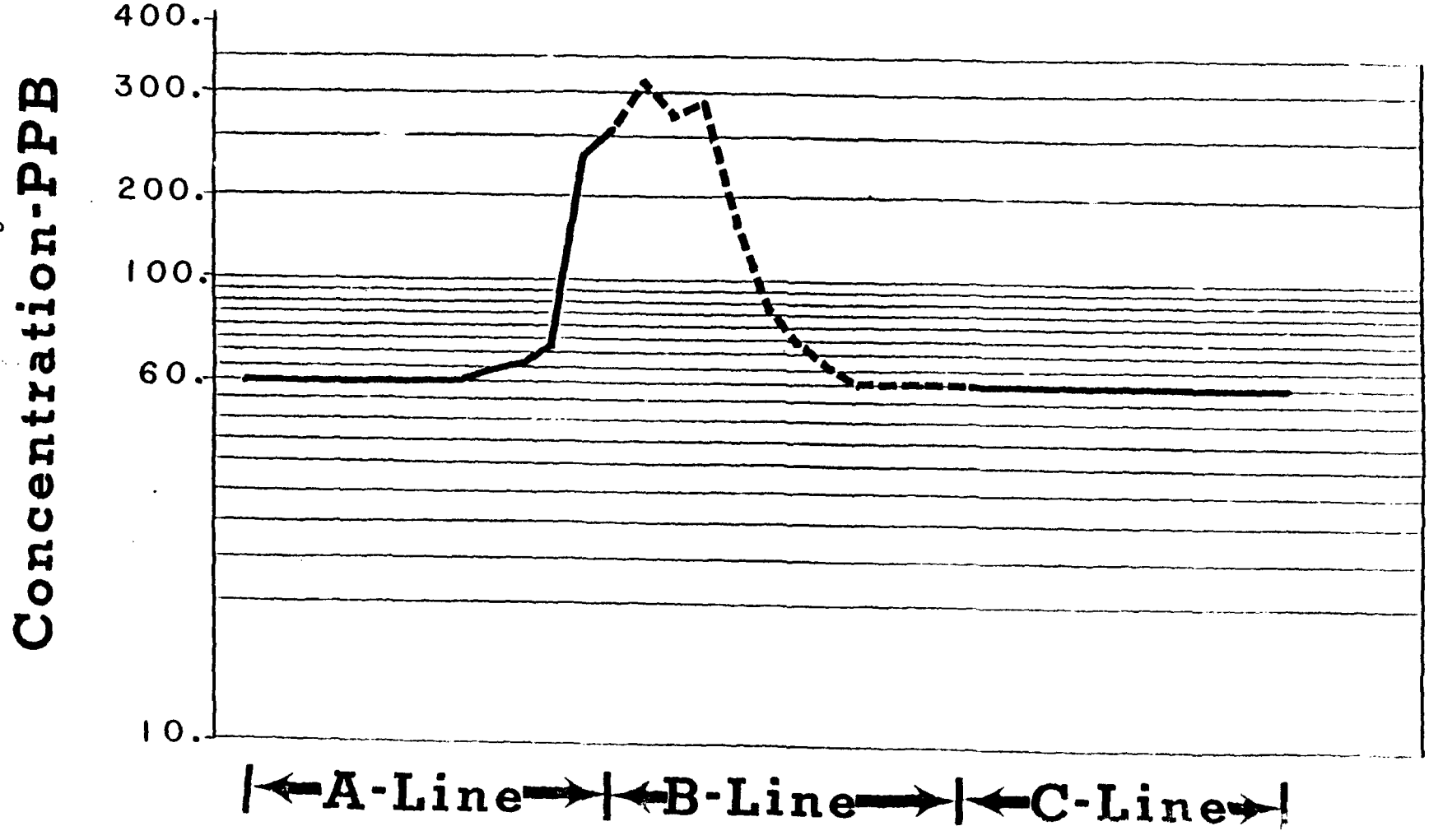
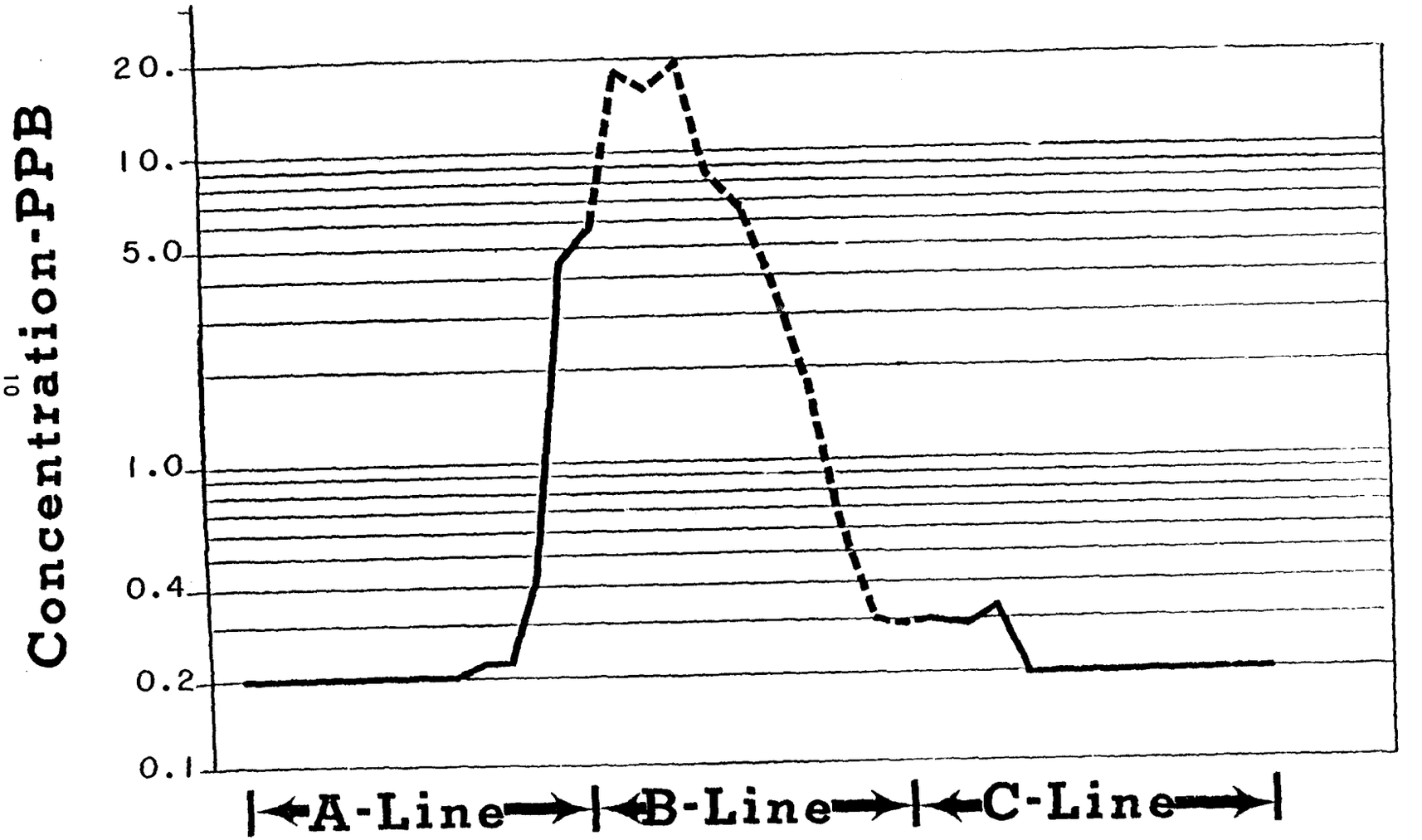


Figure 4

DBCP Averaged [1981-1983]
vs. Alluvial Wells



DCPD Averaged [1979-1983]
vs. Alluvial Wells

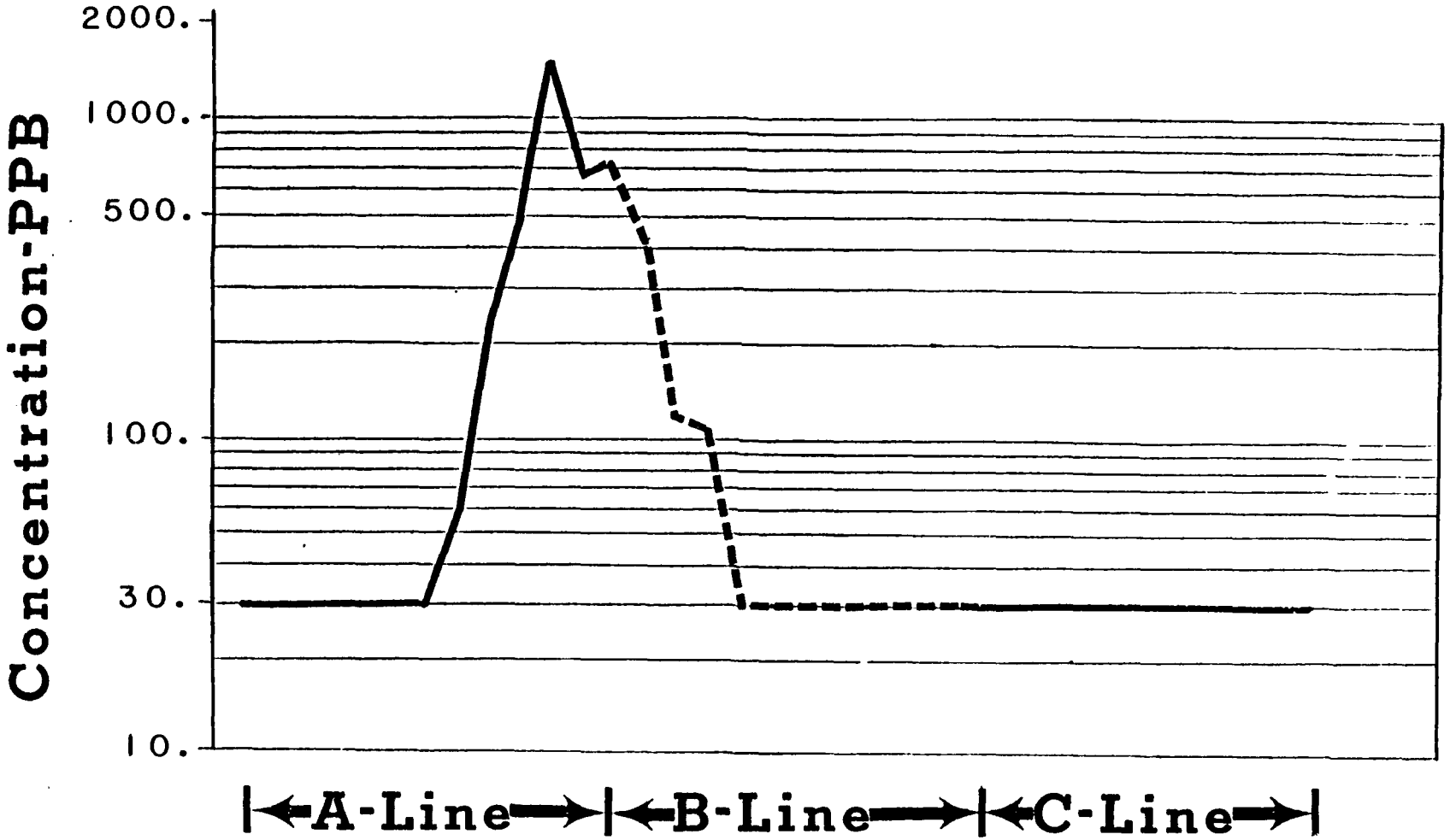


Figure 6

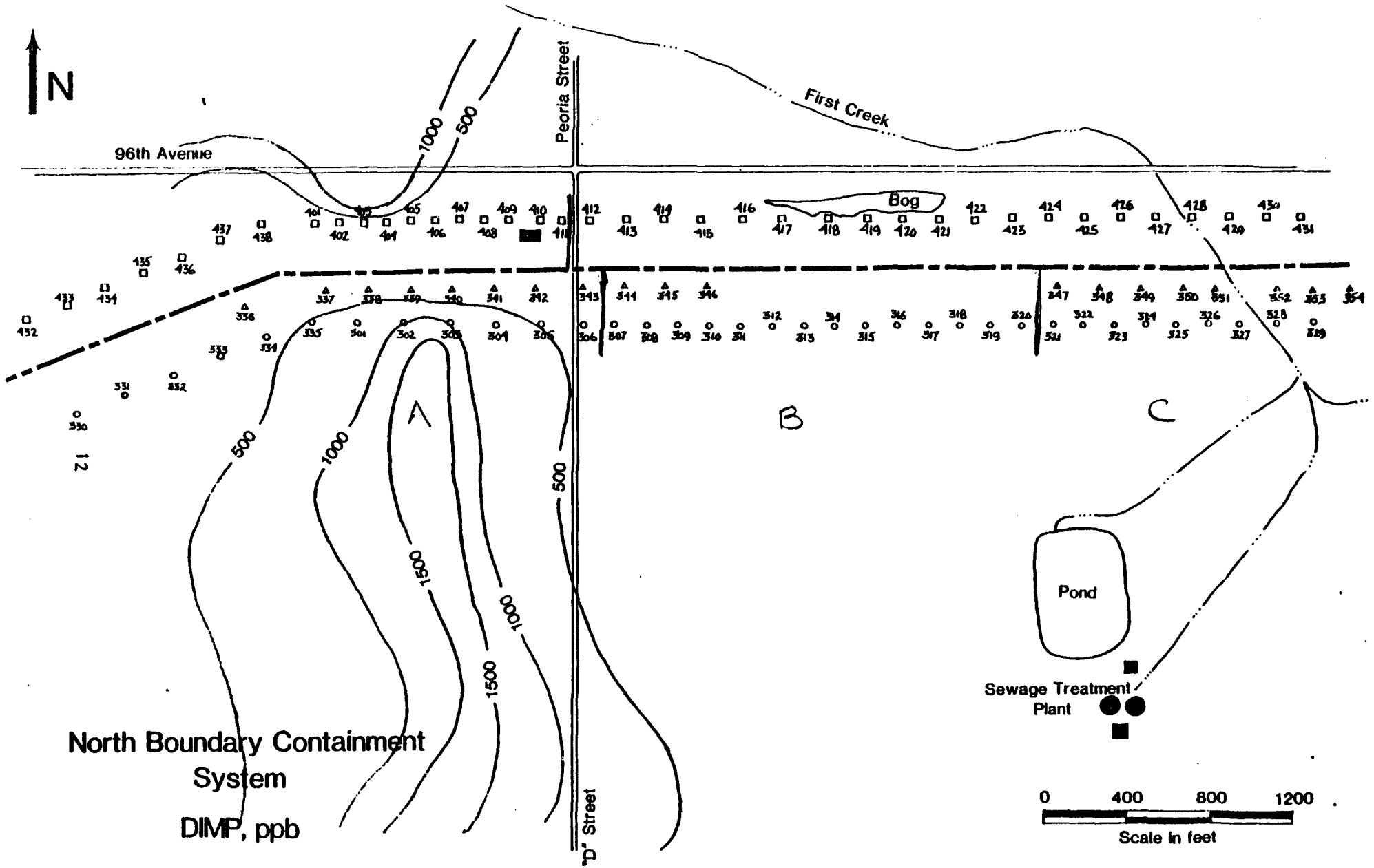

N
96th Avenue
Peoria Street
First Creek
Bog
Pond
Sewage Treatment Plant
A
B
C
500
1000
1500
"D" Street
North Boundary Containment System
DIMP, ppb
0
400
800
1200
Scale in feet

Figure 7

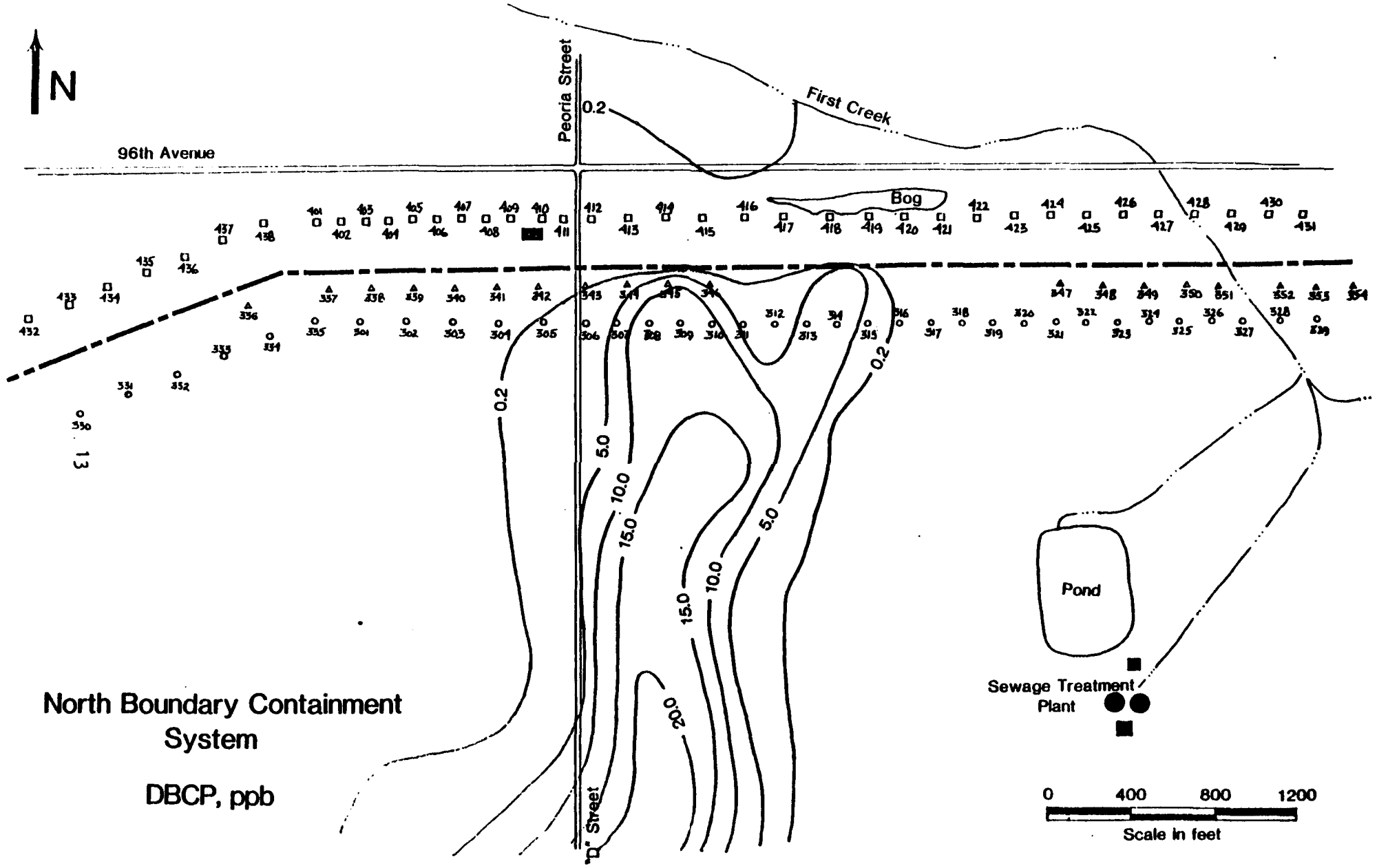

N
96th Avenue
Peoria Street
First Creek
Bog
0.2
5.0
10.0
15.0
20.0
Pond
Sewage Treatment Plant
"D" Street
0
400
800
1200
Scale in feet
North Boundary Containment System
DBCP, ppb

Figure 8

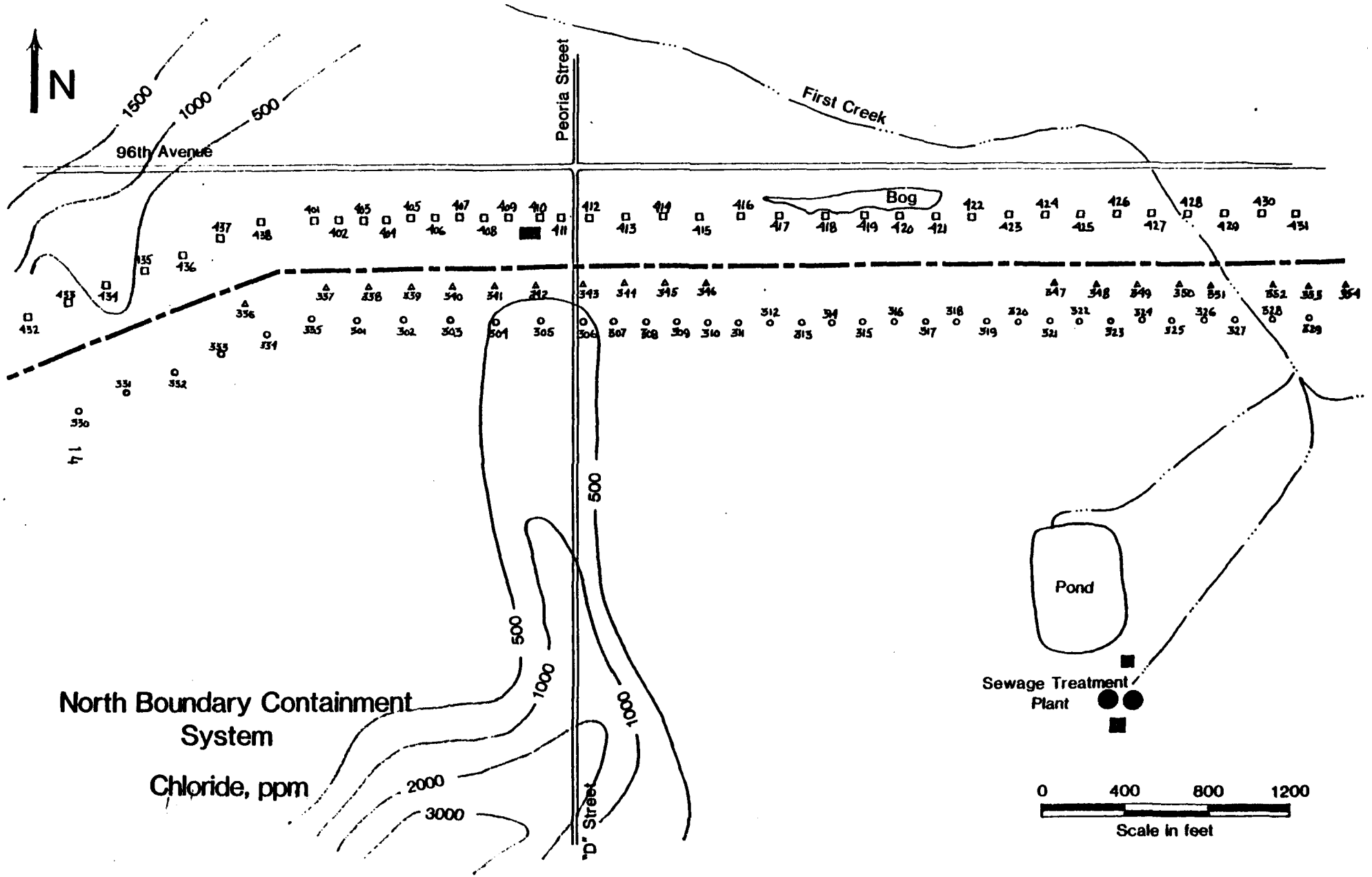
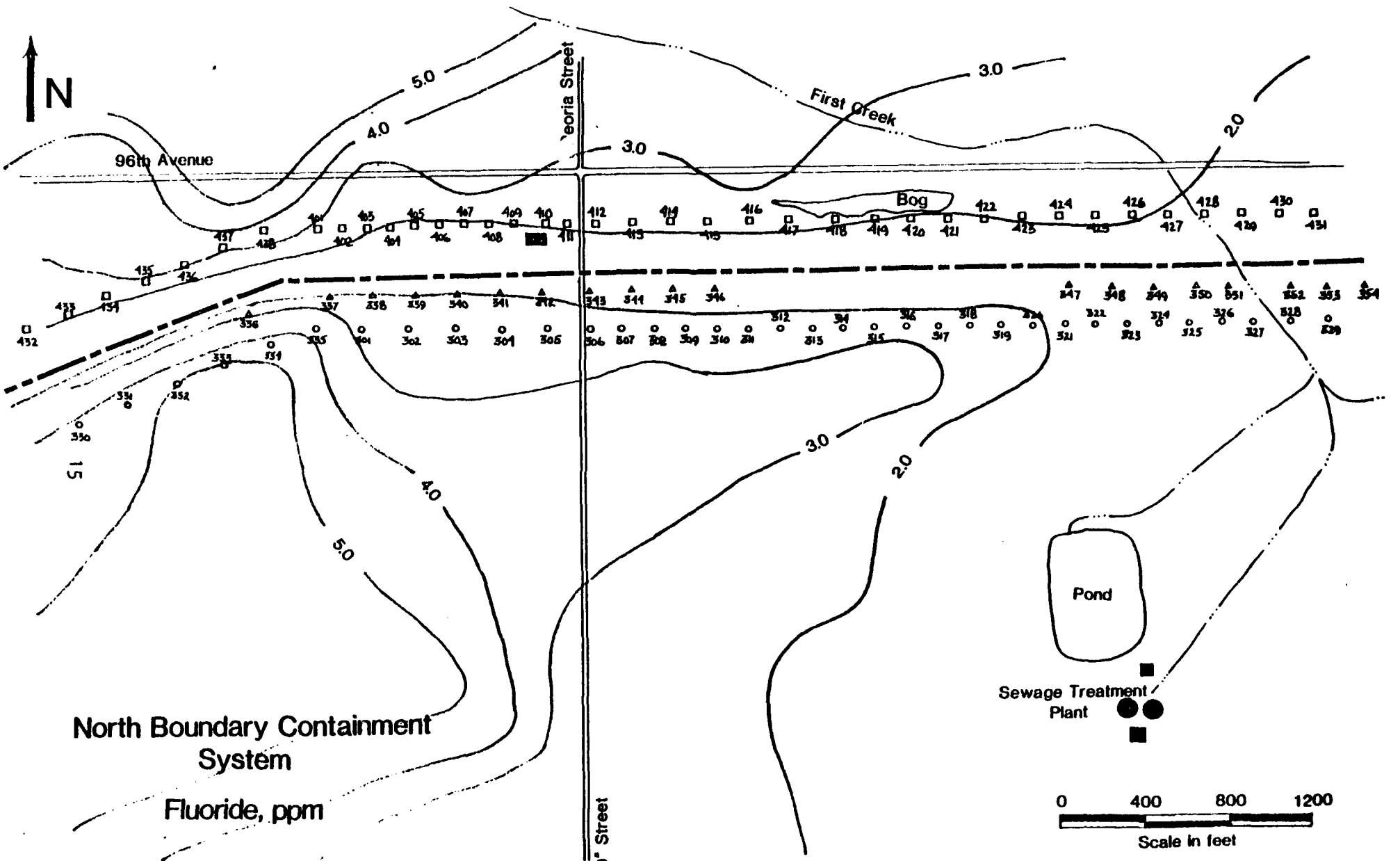

N
1500
1000
500
96th Avenue
Peoria Street
First Creek
Bog
Pond
Sewage Treatment Plant
North Boundary Containment System
Chloride, ppm
500
1000
2000
3000
500
1000
"D" Street
0
400
800
1200
Scale in feet

Figure 9


N
96th Avenue
Peoria Street
First Creek
Bog
5.0
4.0
3.0
2.0
Pond
Sewage Treatment Plant
"D" Street
North Boundary Containment System
Fluoride, ppm
0
400
800
1200
Scale in feet

DENVER SANDS WELLS

The Denver sands wells have for the most part not operated since their installation. The pumps are manually activated for sampling purposes, however, insufficient water is present to activate automatic operation. For the most part, Denver sands wells are free of the extensive contaminations found in the alluvial wells, and with the exception of wells 41 and 42, do not show contamination above detectable level. The plots for these wells are enclosed in the appendix.

HYDROLOGY

Hydrological assessment of the North Boundary system has been made difficult during the life of the expanded system due to the fact the off post monitoring wells projected for monitoring both water level and a contamination downstream of the system were deleted from the project. In addition, inconsistent operation of the recharge system and upset conditions due to the flood of 1983 have minimized the amount of hydrological data available.

In general, upstream water levels have risen during the second half of 1983. Water levels were taken in both February and August 1983 (Figs 11-12) and the Arsenal map indicates a progression of the 5147 level northward. This is contridictory to the observations made with regard to production from the dewatering wells for the same period. Water level maps for years 1977, 1979 and 1983 have not been completed in time for this writing and may lend some insight as to comparative water level features before and after the installation of the expanded barrier.

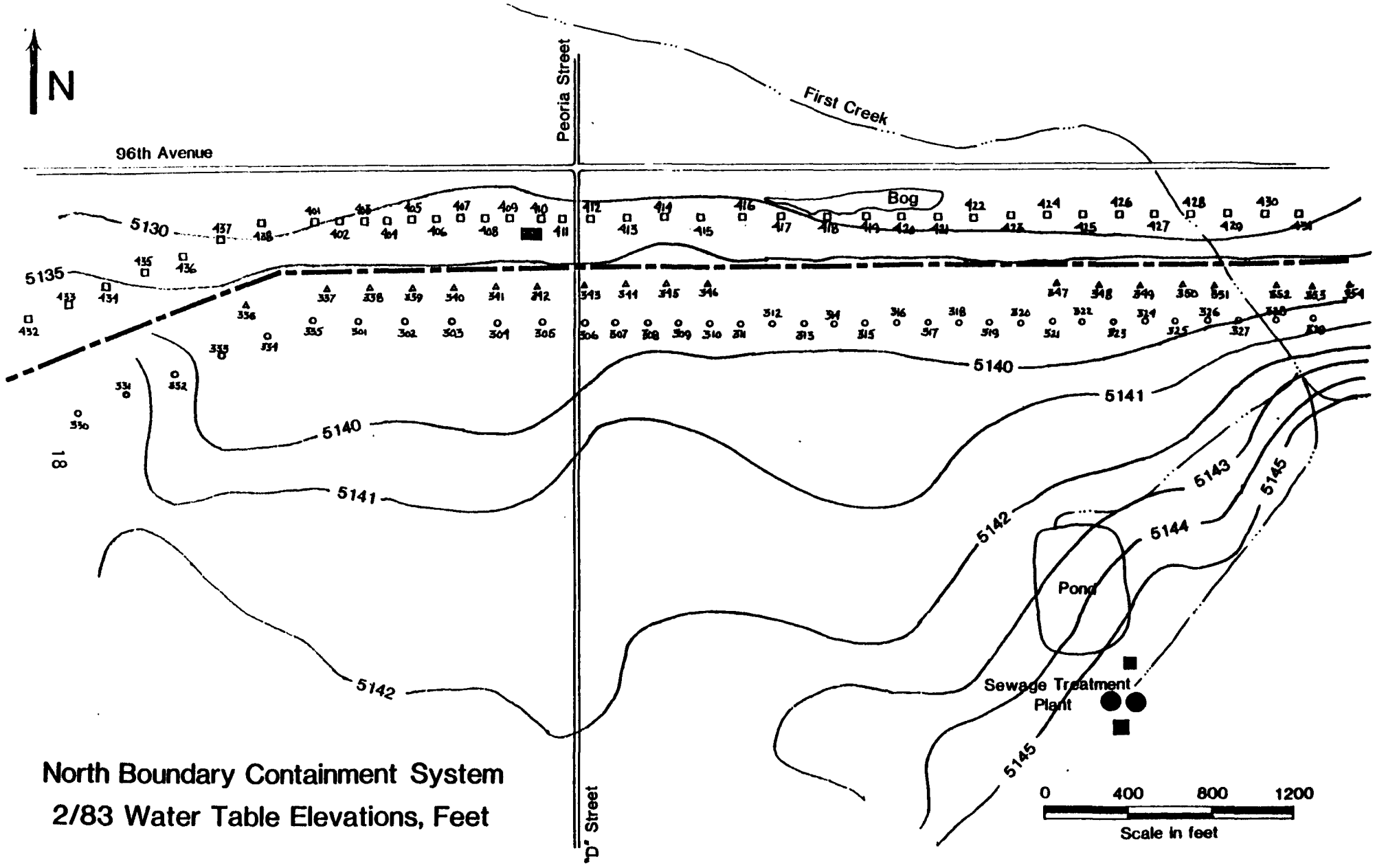
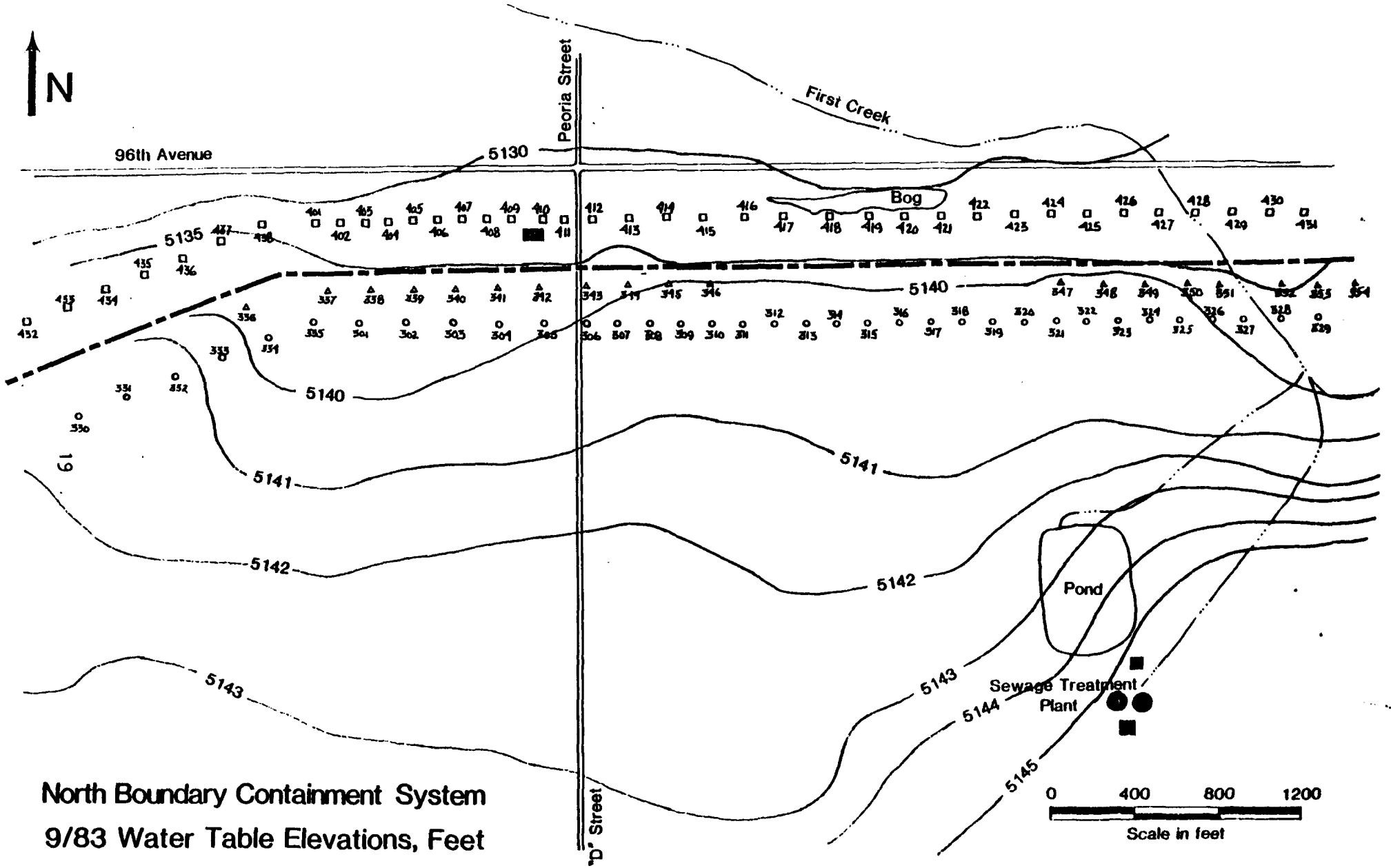

N
96th Avenue
Peoria Street
First Creek
Bog
5130
5135
5140
5141
5142
5143
5144
5145
Pond
Sewage Treatment Plant
"D" Street
0
400
800
1200
Scale in feet
North Boundary Containment System
2/83 Water Table Elevations, Feet

Figure 11



North Boundary Containment System

9/83 Water Table Elevations, Feet

Figure 12

TREATMENT SYSTEM OPERATIONS

General discussion. Total gallons of water treated during the fiscal year was 67 million as compared with 88 million for the previous year (Fig 13). The total gallons treated by the expanded system now stands at 155 million gallons.

Figure 14 indicates the continued downward trend of ground water production from an average flow of 270 gpm upon system startup to 170 gpm at present. It is difficult to determine if the initial production was due to stressing of the aquifer or drawdown of backed up water due to the fact that the barrier was in place approximately six months before the startup of the entire system. At the present time, the dewatering system appears to be pumping all the water available at the wells, however, deterioration of the aquifer or well packing could also account for the reduction in production.

The most drastic change was noted in the "C" section. It appears the east end of the system does not in itself have an alluvial source, but instead, derives a majority of its flow from the sanitary sewer plant and First Creek drainage.

Carbon consumption. As part of plant operations monitoring, carbon consumption is expressed as a function of the quanity of water treated in order to accurately track the actual operating cost and to predict carbon inventory for budget purposes. Figure 15 shows the carbon usage as a function of throughput over the two years of operation for each of the three adsorbers. As predicted, the carbon usage is directly proportional to the concentration of contaminants removed. Adsorber "A" which removes a majority of the contaminants in the system has the highest usage rate, averaging 0.65 pounds carbon per 1000 gallons of water treated while the "B" and "C" adsorbers average 0.15 and 0.08, respectively. These lower values are directly related to the lower levels of contaminants removed (Figs 1-6). Over the past two years, the overall system has averaged 0.3 pounds carbon per 1000 gallons treated water which is one-fourth of the consumption realized in the Calgon fixed bed adsorbers and one-half the consumption originally projected for the system.

Adsorber dynamics study. During the year a study was conducted to better understand the dynamics and flow characteristics of the pulsed flow contactor. It was noticed early in the operations that the adsorbers under certain conditions would exhibit bleed through. This phenomon was attributed to channeling of flow through the carbon bed. Studies were conducted to further understand this condition.

One typical experiment (Fig 16) shows the relationship of a normal bed flow condition vs. the effects of a channelized flow condition. As a result, care must be given to proper attention of the condition of the carbon bed if carbon usage is to be minimized and excursions prevented. In another study (Fig 17) the extent of contamination revoved as a functions of carbon bed depth was investigated to further predict the wave front movement and effective bed depth. Figure 17 shows the effect of uneven distribution to the lower section of the bed (approximately 3 feet depth) vs. the complete removal with uniform flow distribution at the second section (7 feet bed depth).

North Boundary Treatment System
Total Gallons Treated

155,108,500 Total

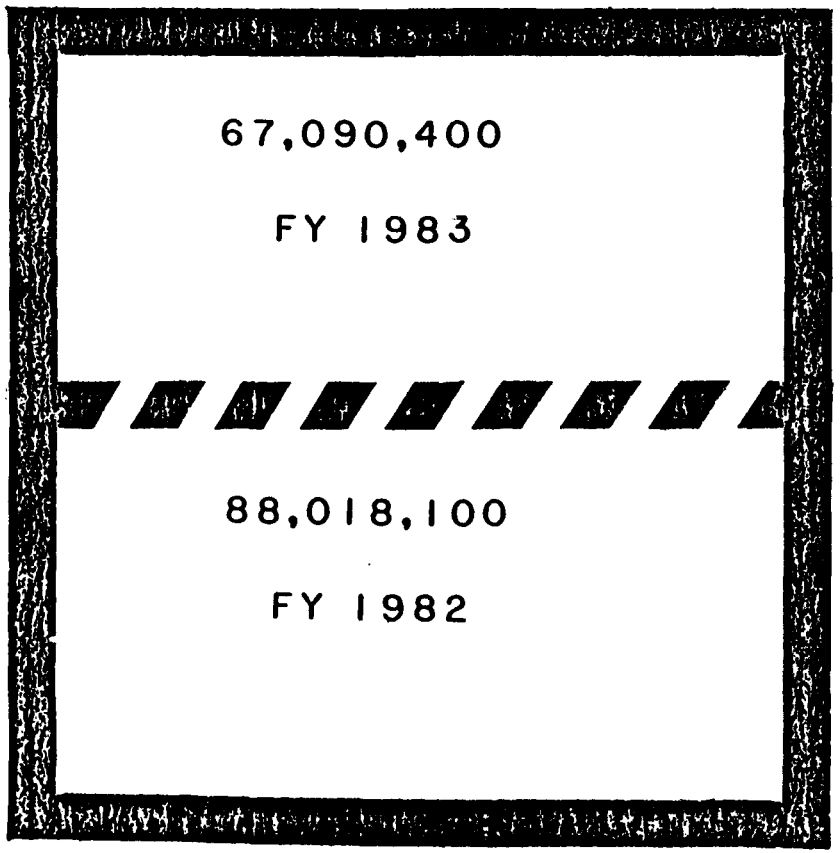


Figure 13

Treated Water Flow

Jan 1982 Thru Sept 1983

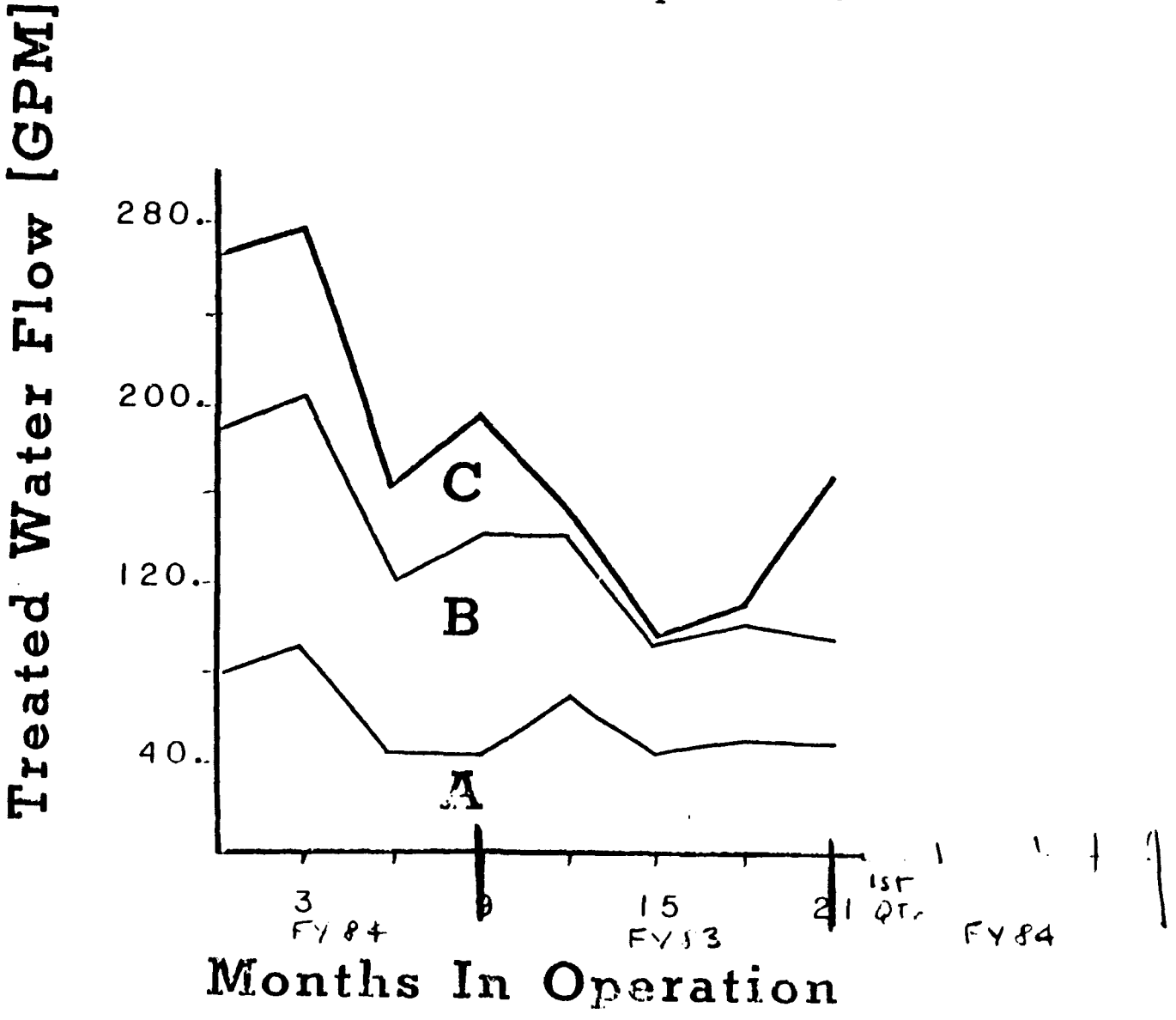


Figure 14

Carbon Consumption

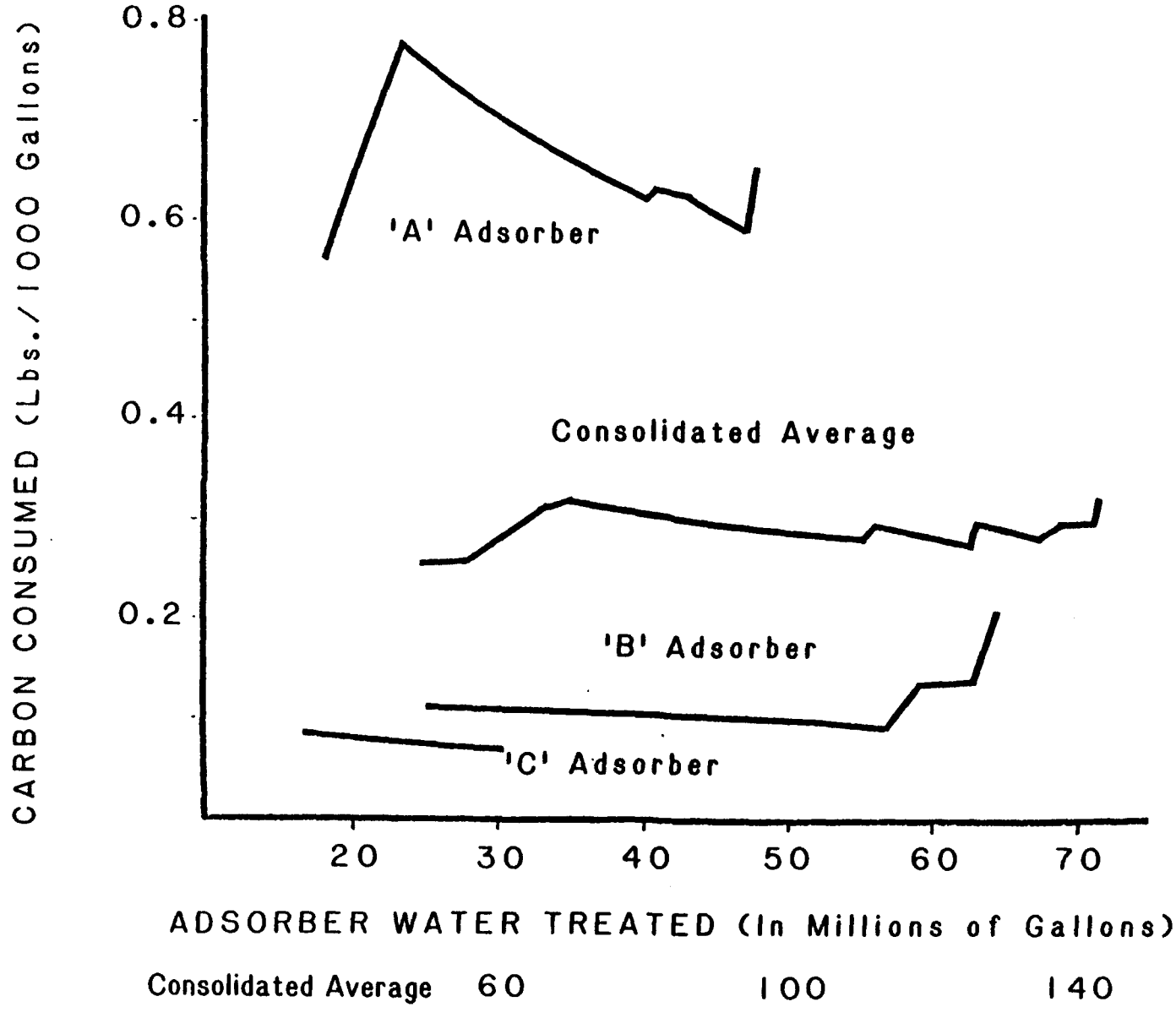
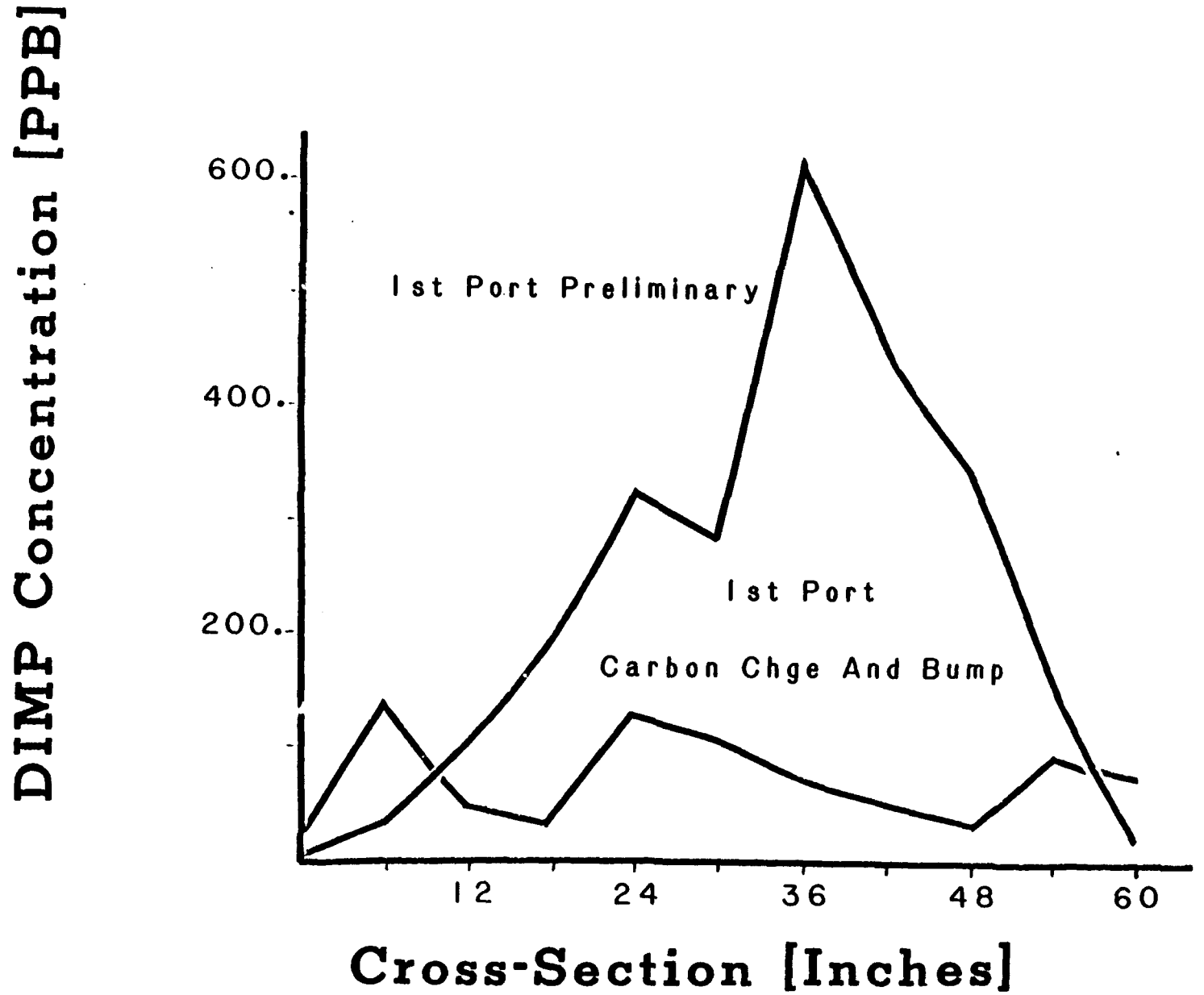


Figure 15

A Adsorber Cross-Section Study



B Adsorber Cross-Section Study vs. Bed Height

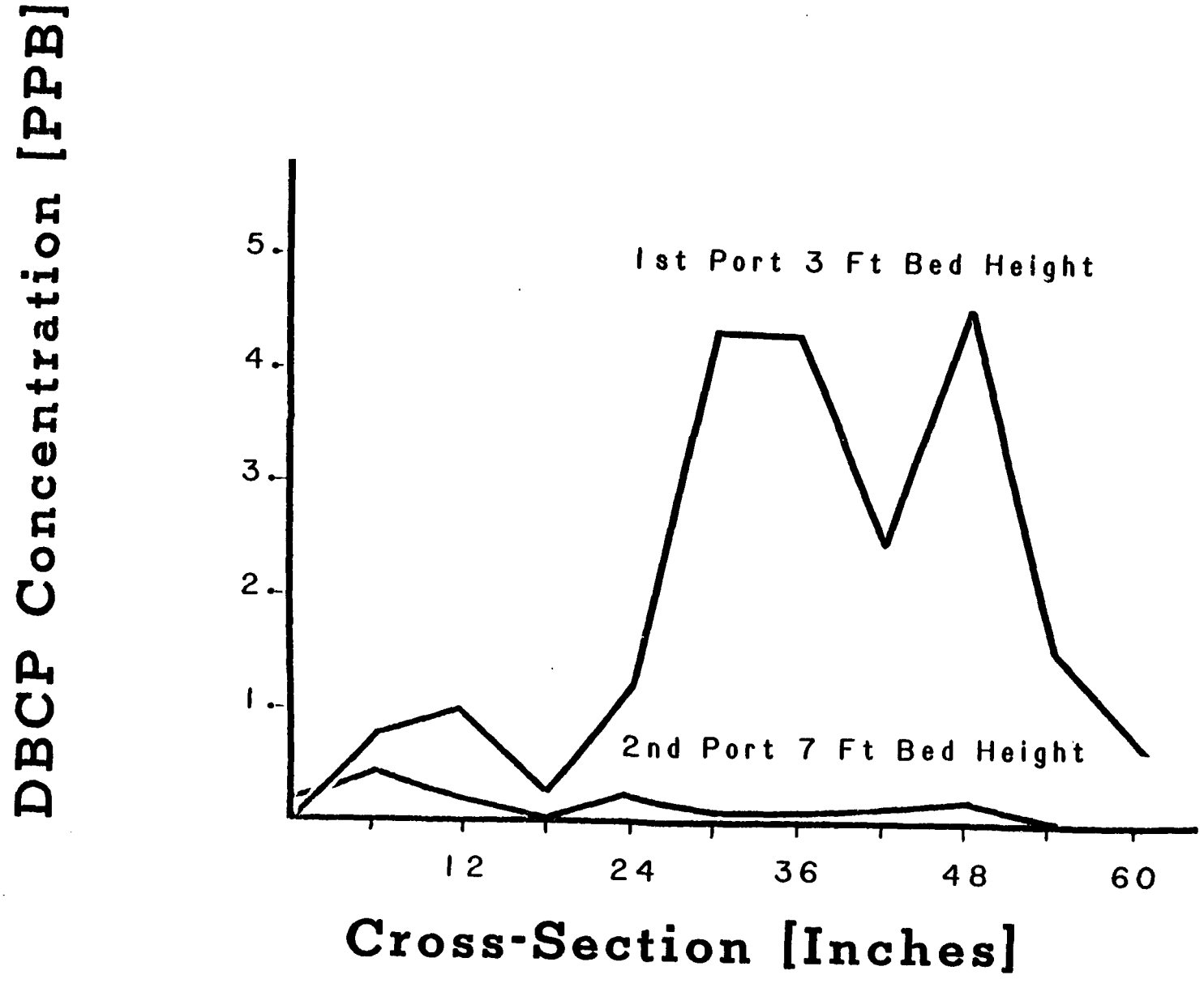


Figure 17

Studies of this nature are ongoing and lend valuable assistance in the understanding, explanation and prediction of adsorber phenomena and system efficiency.

INFLUENT FILTER SYSTEM

The influent filters of a polyester yarn are wound on a spool to meet a minimum 100 micron size filtering requirement. The filters are used to screen out suspended solids from the influent water prior to treatment.

GRAVLAR ACTIVATED CARBON (GAC) TREATMENT

Six elements are installed in each filter and four filters are installed in a parallel for each of the three adsorbers.

Figure 18 shows the average gallons of contaminated water strained per filter bank for each change for their respective adsorber. The "A" adsorber prefilters average ranged from 236,383 to 732,792 gallons in five different replacements. The irregular usage pattern may be attributed primarily to the recycling of the auxiliary sump waste water. Since the plant is operated in a no-discharge mode, foreign material is recycled to the auxiliary sump and after settling to the "A" feed sump. Therefore, this additional load is reflected in "A" filter replacement figures.

A more uniform pattern is reflected in the "B" adsorber prefilters. The prefilter average ranged from 446,917 to 558,658 gallons in four replacements. This variation may be caused by silt from the dewatering wells.

The "C" adsorber prefilters averaged from 653,545 to 235,588 gallons in three replacements. The decrease in capacity of each filter could be caused by well screen breakdown or a failed feeder line, neither item substantiated however. Soil observed on the filter element during replacements indicates the possibility of a ruptured feed line header.

EFFLUENT FILTER SYSTEM

The effluent filters are of the same construction as the influent filters. The filters are used to screen out carbon fines and granules from the treated water prior to entry into the effluent sump. Eight pods are used in parallel to treat the combined effluent from the three adsorbers.

Figure 19 shows the average gallons of treated water filtered for each cartridge replacement.

The post filter average ranged from 75,871 to 1,340,000 gallons in 16 different replacements.

ADSORBER SEPTA SLEEVES

The high filter replacement rate was caused by carbon granules escaping through the adsorber septa sleeves. A wedgewire screen was installed in each adsorber effluent downcomer to determine which adsorber permitted the carbon

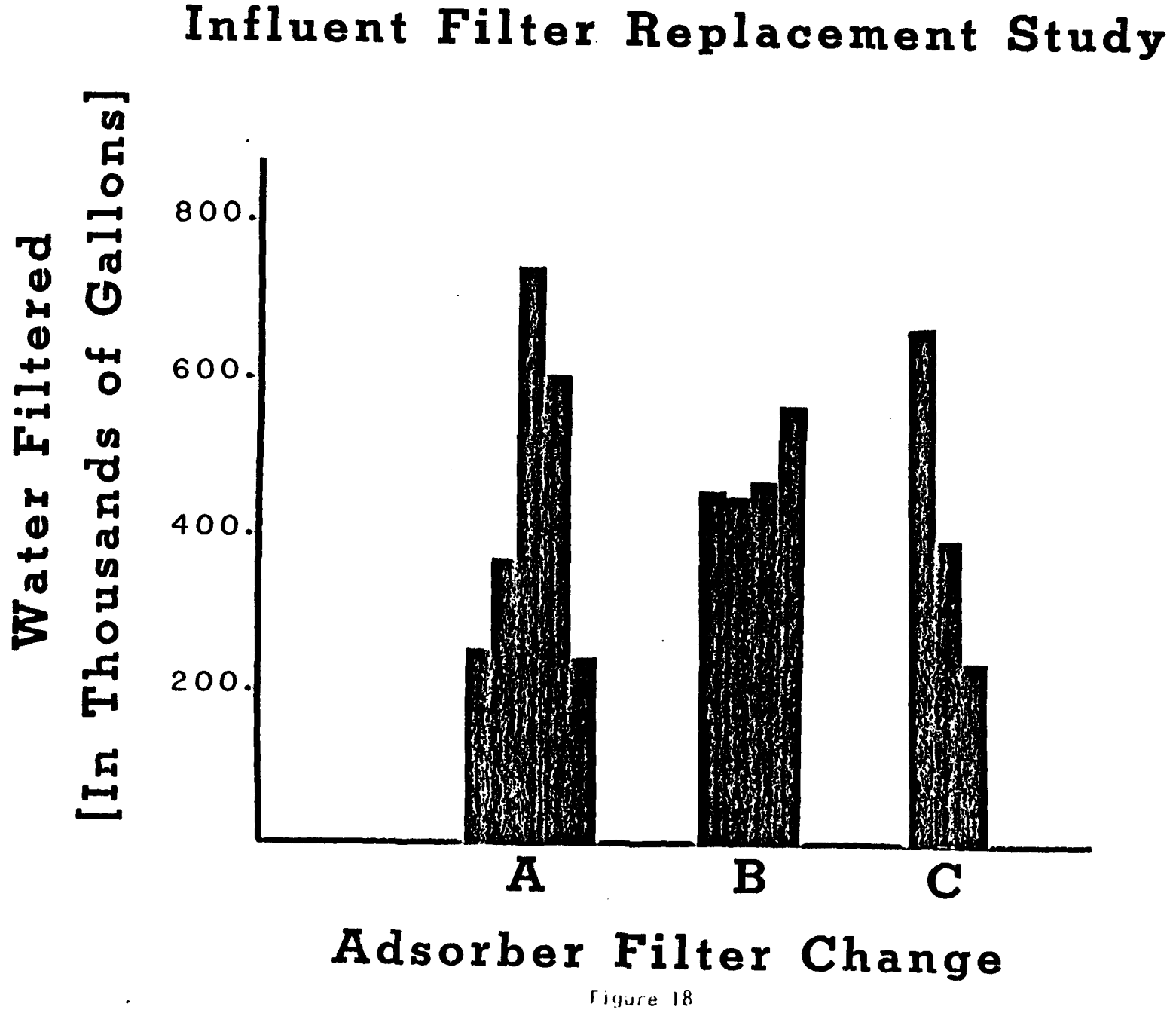
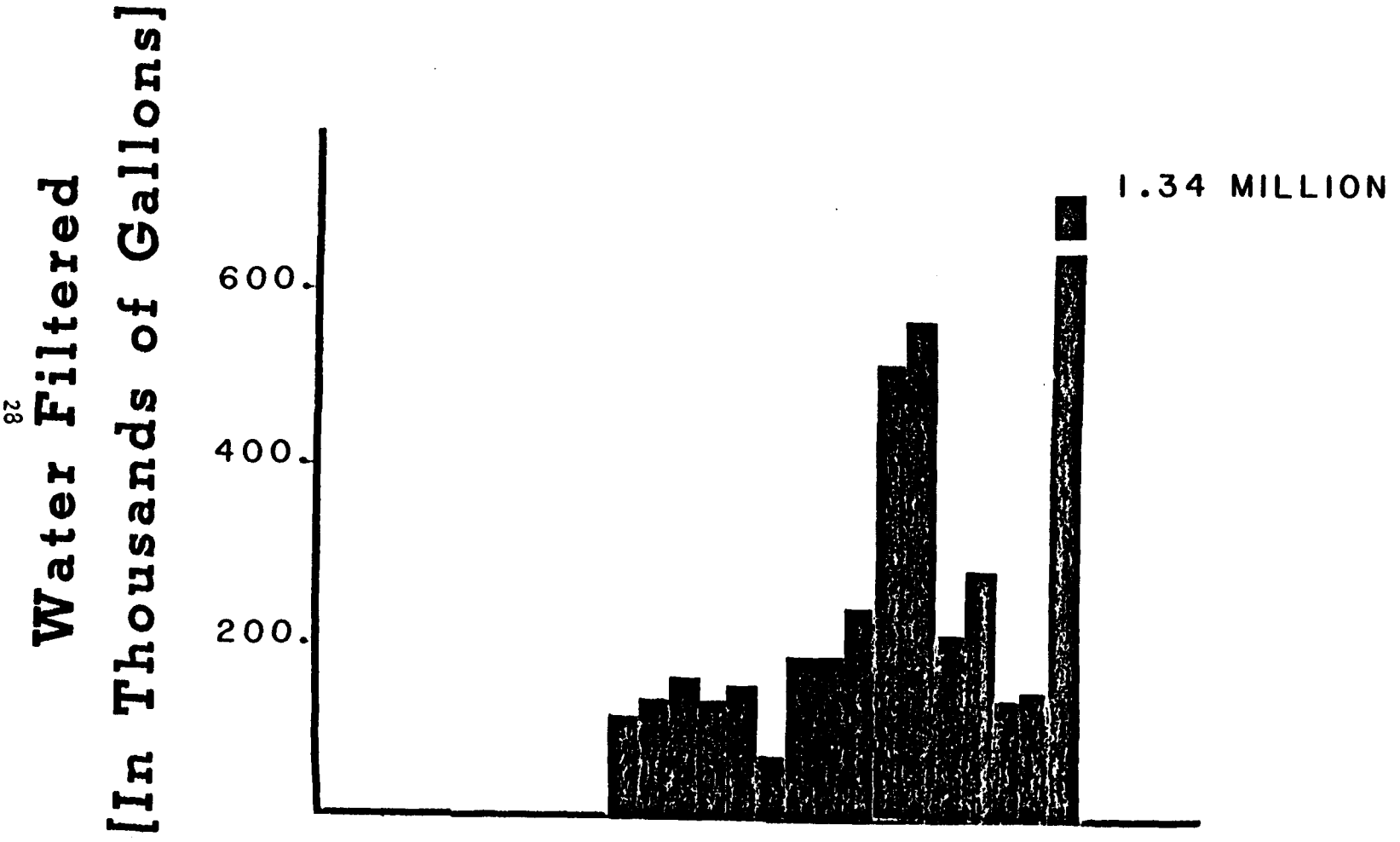

Influent Filter Replacement Study
Water Filtered
[In Thousands of Gallons]
800.
600.
400.
200.
A
B
C
Adsorber Filter Change

Figure 18

Effluent Filter Replacement Study



Effluent Filter Change

Figure 19

granules to escape. Tests were conducted to evaluate various septa sleeve materials. During the tests it was noted that carbon had passed through the loose mesh material installed in "A" and "C" adsorbers. "B" adsorber septa sleeves are of a tight weave material and no carbon granules were observed on the screen. During June 1983 all sleeves were inspected and replaced where necessary with tight weave material.

AUTOMATIC FILTER STUDY

During the year an extensive study was conducted to evaluate an automatically backwashable filter assembly for possible incorporation into the Northwest Boundary project. The results are detailed in a separate report.

CONCLUSIONS AND RECOMMENDATIONS

Although not discussed in this report, the physical (electrical and mechanical) aspects of the system are of utmost concern and priority. Of primary interest is the repair and/or alteration of the recharge and dewatering systems, especially with regard to winterization of the pump houses and modifications to the piping and control systems including flow meters. In addition to the lack of system control attributed to these deficiencies, valuable data (with regard to individual well performance and efficiency) is lost. As is evident from this report, establishment of a valid data base from which to gauge performance and predict trends is essential to proper management and compliance with regulatory requirements. The necessary repairs and changes are being coordinated with the facility engineer.

Of particular interest, because of its resource intensive nature, is the number of samples and compounds being analyzed in support of the North Boundary operation and associated monitoring wells south of the barrier. As seen from the plots in this report, many compounds are not found in the vicinity of the system and can be deleted from analysis except for occasional testing. In other cases, the data base for some compounds has sufficient credibility to allow for an increase in sampling frequency. Thirdly there is a certain degree of duplication with regard to chemical data being taken in the various monitoring programs and the routine samples taken in conjunction with operational or regulatory requirements. An effort should be made to consolidate the sampling and analysis as it pertains to system operations, and more clearly define the objectives of the testing.

Except for the repairs noted in the first paragraph, the single most critical element of the system remains the recharge system. At best, the recharge capacity is borderline with respect to dewatering rate. Since no command policy has been received with regard to surface discharge of treated water, efforts to replace and construct additional recharge wells is an urgent priority.

One apparent discrepancy involves a small increase in ground water elevation in the vicinity of the dewatering wells over the last year and the fact that production from the dewatering system has steadily declined over the same period of time. Since both observations are true, some other presently unknown condition has caused this effect. This can only be understood persuing a comprehensive geologic, hydrologic and operational study with emphasis on stepped-up water level measurements in this area. Since the preconstruction geology has never been translated to the exact barrier location much interpretative data may be gained, thereby percipatating a better understanding of both the relative and anticipated subsurface transport. Information of type would also be invaluable in siting the additional recharge wells discussed in the third paragraph in addition to its application in evaluating theoretical vs. actual well productivity.

Concern regarding the movement of high concentration plumes of DIMP, DBCP and chloride northward from the Basin F area has been previously expressed, however, with the exception of chloride (the process only treats organics), these levels do not pose a problem to the existing treatment system except, of course, to increase the operating costs due to a nigher carbon consumption.

The Denver sands wells, as noted in the discussion, do not produce pumpable quantities of water with the exception of wells 41 and 42. Contamination has not been found in this generally nonproductive formation. One suspects that there may be a physical problem with the construction/ installation of these wells. An investigation regarding the condition of these wells is in order.

NORTH BOUNDARY TREATMENT PLANT LOG - 1982

DATE	COMMENT
11 Jan 82	RMA personnel from Technical Operation Environmental Group assumed responsibility of the North Boundary treatment plant. Flowmeter start: "A" adsorber - 1,358,500 @ 175 gpm "B" adsorber - 3,237,400 @ 240 gpm "C" adsorber - 2,755,500 @ 250 gpm "A", "B" and "C" adsorbers shut down to allow effluent pump to draw down effluent sump. Drawdown elapsed time was 3 hours 45 minutes. Effluent pumps shut down and adsorber pumps started to fill effluent sump. Fill up elapsed time was 1 hour 27 minutes. Dewater (DW) pump 29 shut down because of cycling. Minor cycling of DW pumps 1 and 30. Reset master relay amperage from 250 to 290. Effluent sump pumps cannot keep up with in-flow.
12 Jan 82	PI sump pump breaker tripped with sump overflowing. Reset master relay amperage from 250 to 290. Recharge (RC) well capacity determined to be 284.9 gpm. "B" adsorber sump water supply flow-out is greater than flow-in. Dewatering wells cannot keep sump full with adsorber flow at 275 gpm. "B" adsorber pump shuts down for 10 minutes every two hours. DW pump 8 shut down for cycling at one second intervals.
13 Jan 82	Flows reset on adsorbers at 1000 hours as follows: "A" - 150 gpm, "B" - 195 gpm, and "C" - 190 gpm at 1634; adsorbers "A" and "C" set to 100 gpm each. Too much pressure on adsorber "B". Adsorber "B" set to 150 gpm.
14 Jan 82	Pressure high on influent filters. Adjusted pressure by controlling flow through inlet lines. Sump "A" overflow - breaker not tripped; breaker manually tripped and reset, now operating. Adjusted adsorbers to 100 gpm on "A", "B" and "C".

DATE	COMMENT
15 Jan 82	DW pumps 8, 11 and 14 cycle.
	Sump "A" pump breaker at pump not closing to shut off. Dewatering wells causing overflow. Sturgeon Electric examined and stated to call if problem continues.
	Drilled ½" diameter holes in 40 and 50 gpm capacity recharge well covers.
	DW well 28 has broken check valve. "C" sump line shut down until check valve repaired.
	RC well 23 overflowing and turned off.
	DW 14 has broken check valve; "B" adsorber supply turned off.
	About 70 percent of dog house covers found open.
	DW 8 pump turned off at well.
16 Jan 82	DW 28 repaired.
	DW 14 - inlet line plugged and plumbing removed.
	DW 28 busted. Turned off. Found O-ring damaged; repaired.
	Effluent filters changed.
18 Jan 82	DW 14 repaired.
19 Jan 82	Sump "A" overflowed; corrected. One quart oil added to P1 pump.
20 Jan 82	Replaced 6 amp fuses in DW 24.
22 Jan 82	West recharge well breaker tripped; reset. West recharge wells overflowed.
23 Jan 82	West recharge well breaker tripped; reset.
	One quart oil added to P3 pump.
	Several dog house doors found open.
24 Jan 82	West recharge well breaker tripped; reset.
	Several dog house doors open.
25 Jan 82	West recharge well breaker tripped; reset; tripped.
	RC 33 - flow shut off, solenoid not.

DATE	COMMENT
25 Jan 82 (cont'd)	DW 47 - check valve broken.
	One quart oil added to P1.
26 Jan 82	DW 19, 20, 30, 41, 42, 43 and 46 not functioning.
	DW 30, 41, 42 and 46 - started operating when relays reset.
	DW 20 - breaker tripped inside dog house; reset.
	DW 19 - breaker inside dog house tripped; reset; tripped.
	Sample valves for DW 30 and 41 repaired.
27 Jan 82	West recharge well breaker tripped. All west recharge wells turned off. RC 24 and 25 - dole valves removed.
	DW 47-54 turned off. Contaminants not detectable.
28 Jan 82	"A" sump overflowed. P1 breaker not tripped. All "A" system dewatering wells turned off.
29 Jan 82	DW 19 not functioning.
30 Jan 82	RC 10 - flo regulator removed.
	Batteries in flow meter replaced.
	DW 19 not functioning.
01 Feb 82	Auxiliary sump pumped down.
	RC well 1 - solenoid and transformer replaced.
	P1 pump rely replaced.
	RC wells 32-38 and 2-9 turned on.
	RC 1 - transformer still not going.
03 Feb 82	West recharge well breaker tripped; reset.
	RC 32-35 and 37 overflowing.
04 Feb 82	West recharge well breaker tripped; reset.
06 Feb 82	DW 30 - not pumping; relay reset; okay.
09 Feb 82	RC 25 - opened bypass. Ran two hours. Returned to normal position in afternoon.

DATE	COMMENT
10 Feb 82	RC 25 - same as 9 Feb 82.
11 Feb 82	Plant shut down to repair electrical shorts near RC 35, 36 and 38.
	RC 9 - frozen line; shut off.
12 Feb 82	Plant restarted.
	Added ½ quart oil to P1, P2 and P3.
13 Feb 82	RC 3 - line and valve broken.
	RC 8 - bypass line broken.
	RC 32 - battery changed in flowmeter.
	RC 22 - overflows; manually throttled back.
15 Feb 82	Auxiliary sump not operating.
16 Feb 82	RC 31 - removed dole valve.
17 Feb 82	"A" adsorber prefilters replaced.
18 Feb 82	RC well 26 - raised upper water level probe.
	DW 41, 43 and 46 - dog house doors open.
20 Feb 82	RMA security personnel checking influent sumps every two hours during off hours.
21 Feb 82	RC 20 - turned off because of leaks.
	Effluent filters replaced.
	Raised lower water level probe in RC wells 21-24, 26-28 and 31.
	Upper water probe raised in RC 24 and 28.
22 Feb 82	Restarted RC 20; still leaks.
	Raised lower water level probe in RC 14-17, 19 and upper water level probe in RC 14.
23 Feb 82	Raised lower water level probe in RC 5-13.
24 Feb 82	Work release called in to add protective bumper post around propane storage tank.
25 Feb 82	Raised lower water level probe in RC 2-4.
	Repaired RC 19 valve.

DATE	COMMENT
26 Feb 82	Greased P1-P5 sump pumps.
	Rich McCrae of Corp of Engineers (COE) contacted regarding finishing work on North Boundary "wants letter".
28 Feb 82	RC 20 - still leaks.
02 Mar 83	Reviewed letter with Rich McCrae regarding DW 8 and 19.
	RC 1 - not functioning; plugged at dole valve.
04 Mar 82	Protective bumper post installed at west end of propane storage tank.
	Fire hose routed from RC 20 to bog.
09 Mar 82	"B" adsorber prefilters replaced.
10 Mar 82	Fire hose routed from RC 19 to bog.
	Greased P1-P5 sump pumps.
11 Mar 82	Effluent filters replaced. Observed carbon accumulation in pods.
12 Mar 82	Water level probe settings revised in RC wells 23, 24, 26, 27 and 31.
14 Mar 82	RC well 10 - dole valve removed.
	Water level probe settings revised in RC wells 10 and 37.
15 Mar 82	Water level probe reset in RC well 12.
17 Mar 82	Water level probes reset in RC wells 13-18, 22 and 28-30.
19 Mar 82	RC wells 10, 12 and 16 - overflowing.
	RC well 10 - water flow rate reduced. Also, no electric power.
	RC wells 12 and 16 - water flows cut off.
21 Mar 82	RC well 12 - valve energizer replaced.
	RC well 23 - overflowing; reduced water flow.
	Dog house doors found open on DW wells 6, 9, 17, 36, 29-41, 43, 44 and 52-54.
22 Mar 83	Protective bumper post installed at east end of propane storage tank.
	RMA paint shop started painting letters and numbers on all wells.

DATE	COMMENT
23 Mar 82	Effluent filters replaced.
25 Mar 82	5" diameter screens added to adsorber effluent downcomers to find carbon leak.
27 Mar 82	Back pressure rose to 40 psi in "A" adsorber and 39 psi in "C" adsorber.
	Flows to adsorbers stopped.
28 Mar 82	Screens removed from adsorbers. Carbon found on screen in "A" and "C" adsorbers.
	Adsorbers restarted.
30 Mar 82	RC well 24 - overflowing water; flow reduced.
31 Mar 82	RC well 12 - overflowing; flow stopped.
	West RC well breaker tripped; reset.
01 Apr 82	Removed high level alarm agitator from control panel.
	RC well 24 - overflowing; flow reduced.
	RC well 12 - flow throttled back.
	New auxiliary sump pump temporarily installed until original pump is repaired.
	Added one quart oil to P1 and P3.
02 Apr 82	RC well 28 - overflowing; flow reduced.
04 Apr 82	West RC well breaker tripped. No electric power at RC wells 9, 20, 29 and 32-36.
	RC well 18 - solenoid hot; water flowing.
05 Apr 82	West RC well breaker tripped; reset.
	Approximately 30 pounds height was introduced into effluent sump.
06 Apr 82	West RC well breaker tripped; reset.
07 Apr 82	West RC well breaker tripped; reset.
	RC well 15 - overflowing; flow throttled down.
09 Apr 82	Effluent filters replaced.
11 Apr 82	West RC well breaker tripped; reset.

DATE	COMMENT
11 Apr 82 (cont'd)	RC well 18 - overflowing; solenoid hot; flow reduced.
	RC well 37 - overflowing. Operates satisfactorily when RC well breaker was reset.
12 Apr 82	Steel wool added to adsorber effluent downcomers to verify carbon leak.
	Auxiliary sump overflowed; plant shut down.
	Auxiliary sump overflow float control installation started by Wesco.
13 Apr 82	Auxiliary sump overflow float control installation completed.
	Effluent sump overflowing. Pumps P4 and P5 not operating in automatic mode. Rich McCrae of the COE contacted.
14 Apr 82	McDonald of RMA fire department contacted to trip main breaker. Auxiliary sump overflow float control did not function. Wesco rerouted hot line.
15 Apr 82	Electrical contractor appointment set for 19 April 1982 to determine P4 and P5 malfunction.
16 Apr 82	Plant operated on day shift only. Plant shut down for weekend.
18 Apr 82	Rich McCrae of the COE called and cancelled the 19 Apr appointment.
19 Apr 82	Plant operated on day shift only.
	RC well 20 - turned on.
	Original auxiliary sump pump installed.
20 Apr 82	Plant operated on day shift only.
21 Apr 82	Plant operated on day shift only.
22 Apr 82	Plant operated on day shift only.
	Rich McCrae of the COE reset electrical appointment for 23 Apr 82.
23 Apr 82	Sturgeon Electric, Alvarado Construction and Wesco Electric resolved to trouble shoot P4 and P5 problem on 26 Apr 83.
25 Apr 82	RC well 13 - overflowing; flow rate reduced.
	Effluent filters and "A" adsorber influent filters replaced.
26 Apr 82	Sump pump P2 contact sticking in control panel. Repaired by Sturgeon Electric.

DATE	COMMENT
26 Apr 82 (cont'd)	P4 and P5 problem attributed to unmarked breaker being tripped.
27 Apr 82	Greased sump pumps P1-P5.
28 Apr 82	P2 sump pump is not functioning; pushed reset button. Rich McCrae observed problem.
	Added one quart oil to P3 sump pump.
29 Apr 82	No. 77 effluent filter line valve leaking; tightened.
	Found RC water manifold between RC wells 18 and 19 approximately 50 feet south of drawing location. Electrical line broken during trenching operation. Work release called in to repair.
30 Apr 82	Located 3" diameter manifold line east of DW well 26.
02 May 82	RC well 1 - dole valve removed.
03 May 82	Breaker to east RC wells tripped to permit electrical repairs.
04 May 82	RC wells 13 and 14 - overflowing; flow throttled down.
	Auxiliary sump pump installed completed.
06 May 82	One quart oil added to P1 sump pump.
07 May 82	RC wells 2 and 7 - plugged; opened bypass valve.
	RC wells 4 and 6 - plugged; cleaned "Y" strainer.
08 May 82	Sump "C" overflowing. Breaker tripped; reset; no cause found.
09 May 92	All dewatering wells for "B" sump system were turned off. They were turned on.
10 May 82	RC wells 32-37 - water strainers were cleaned and water level probe settings revised.
16 May 82	RC wells 1 and 38 - water strainers were cleaned. No water flow in RC 38; plugged dold valve.
17 May 82	"C" sump showed full on control panel and sump pump was not running. Turned switch to hand and back to automatic mode; high level light went out and DW wells for "C" sump system started filling sump.
	RC wells 2-7, 10 and 11 - water strainers cleaned.
	RC wells 2-7 and 11 - operates with bypass valve open only.

DATE	COMMENT
19 May 82	Effluent filters replaced.
20 May 82	Cleaned water strainers in RC wells 21-24, 27, 28, 30 and 31.
	Replaced water strained in RC wells 26 and 29.
	No flow noted in RC wells 22 and 30.
21 May 82	RC well 22 - partially closed valve was plugged; cleaned.
	Effluent sump pump P5 breaker tripped; reset.
	"C" sump showed full on control panel and sump pump was not running. Flipped switch to hand and back to automatic mode. Normal function started.
23 May 82	RC well 22 - overflowing; flow reduced.
24 May 82	Breakers tripped inside dog houses of DW wells 14-16, 18 and 19. No water flow was noted from DW wells 19 and 46-49.
	DW wells 47 and 48 - have poor ground.
	One quart of oil added to pump P2.
25 May 82	DW well 49 - transformer not functioning.
27 May 82	Breaker for effluent sump pump P5 tripped; reset.
	Greased sump pumps P1-P5.
28 May 82	Malfunctioning of DW wells 14-16, 18, 19 and 47-49 reported to Rich McCrae of COE.
01 Jun 82	DW wells 1 and 21 - electrical switch was found in hand mode; reset to automatic.
	North Boundary plant down. Found breakers for P1-P3 sump pumps tripped; reset. P2 breaker tripped. Contractor and the COE noticed line transformer had lost a phase.
02 Jun 82	Defective line transformer removed for repair.
03 Jun 82	Bechtel Construction started flushing RC well 26.
04 Jun 82	Bechtel Construction removed DW well 19 pump.
10 Jun 82	Repaired line transformer installed.
16 Jun 82	Flushing of RC wells 12-26 was completed.
	Repaired DW well 19 pump installed but not wired for operation.

DATE	COMMENT
17 Jun 82	Sturgeon electricians observed that the P1, P2 and P3 transformers were blown.
21 Jun 82	Sturgeon electricians installed new transformers. During check out of the system, they noted that the three coils were also burned out and one set of contactors were fused together.
22 Jun 82	The three new coils and contactor set were installed and the plant put in operation. The breaker for P1 sump pump which supplies contaminated water to adsorber "A" kept tripping. Fail safe switch of auxiliary sump proved satisfactory during check out. All adsorbers shut down for the day.
23 Jun 82	Transferred nine blowcase volumes of spent carbon from adsorbers to spent carbon storage hopper. Adsorber count of spent carbon:

Adsorber	Blowcase Volume	Odometer
"A"	6	18,537,400
"B"	2	25,477,000
"C"	1	16,921.500

24 Jun 82	Widing transportation was loaded with spent carbon. A 7th blowcase volume of spent carbon was removed from "A" adsorber to complete the load to the hopper trailer.
25 Jun 82	Transferred two blowcase volumes of virgin carbon from fresh carbon hopper to "B" adsorber. On transfer of fresh carbon to "C" adsorber, the fill line got plugged. The fill line was cleared too late to complete carbon fill of "C" adsorber. "B" adsorber was put in operation mode for the weekend.
29 Jun 82	Rich McCrae of the COE was made aware of P1 sump pump problem.
30 Jun 82	Completed filling "C" adsorber with fresh carbon.
01 Jul 82	Fresh carbon storage hopper was emptied during transfer of carbon to "A" adsorber. "C" adsorber sump showed full, but P3 sump pump was not operating. Turned switch to hand mode and back to automatic; the high water level light went off and the dewatering wells for "C" adsorber system began to fill the sump.

DATE	COMMENT
01 Jul 82 (cont'd)	P2 sump pump control switch does not turn pump off when changed to "off" mode.
	Greased sump pumps P1-P5.
02 Jul 82	Jeff of Alvarado Construction was made aware of DW well 49, P1 sump pump and P2 sump pump switch.
07 Jul 82	RMA personnel replaced light bulb in north bank, 2nd position from west wall.
09 Jul 82	"C" adsorber sump high water level was on, but P3 sump pump was not operating. P3 sump pump switch turned to hand mode and back to automatic. The high water level light went out and the "C" adsorber system dewatering wells started to fill the sump.
12 Jul 82	DW well 47 was repaired.
19 Jul 82	P3 sump pump breaker tripped at control panel causing "C" sump to overflow.
	P2 sump pump coil button stuck in continuous operating mode causing the effluent sump to overflow.
21 Jul 82	RC well 19 was replumbed to accept a fire hose.
22 Jul 82	P2 sump pump coil button stick in continuous operating mode.
	Rich McCrae of the COE contacted with regards to P1 sump pump repair. No date was set for the repair of the pump; it was determined that the motor winding was lost.
	Sturgeon Electric notified of P2 sump pump coil button problem.
23 Jul 82	Greased sump pumps P1-P5.
26 Jul 82	DW well 36 - water level probes lowered; only 8½ feet of wire available.
27 Jul 82	P2 sump pump coil button repaired.
02 Aug 82	P1 sump pump motor was removed for repair sometime between 31 Jul and 2 Aug.
	DW wells 16 and 18 - breakers tripped inside the dog house; reset.
04 Aug 82	North Boundary building - northeast unit heater exhaust stack was sealed to eliminate water leak over master control panel.
09 Aug 82	P1 sump pump motor installed and was made operational.

DATE	COMMENT
09 Aug 82 (cont'd)	Four sets of dewatering well water level probes were moved to a lower position.
	"A" adsorber was taken out of the operation mode for the day.
10 Aug 82	"A" adsorber was put back on line.
13 Aug 82	"B" adsorber influent filters were replaced at odometer reading of 32,704,200.
	An Albany International automatic backwash filter assembly arrived for an engineering evaluation.
16 Aug 82	Plant temporarily shut down to install the new filter assembly.
17 Aug 82	A trial run was made utilizing the new filter aseembly.
18 Aug 82	An air line was routed from the air compressor to the new self-cleaning filter. The new filter assy was made operational. Representatives from Stonehand Industries (local) and Albany International Engineered Systems observed the operation this afternoon.
19 Aug 82	Oil in air pressure control of new filter assy was missing. Oil observed in air line and control valves. Stonehand Industries contacted.
20 Aug 82	New filter assy #5 lower valve sticking.
22 Aug 82	Same as above.
23 Aug 82	New filter assy operating satisfactorily.
	Added ½ quart oil to P2 and P4 and 1 quart oil to P1 and P3. Greased sump pumps P1-P5.
24 Aug 82	New filter assy #5 valve sticking. Hand controlled backwash of filter element. Evaluated new filter assy with only first pod of west bank in operation.
25 Aug 82	"A" adsorber - cross section water samples were taken 6" apart at #1 sample port to evaluate possible channeling condition through the carbon bed.
	New filter assy #1 and #3 lower valves sticking. Hand controlled backwash of filter element. Automatic backwash cycle was 68 minutes.
26 Aug 82	New filter assy was plugged. Automatic backwash was being performed in 2-minute intervals. Effluent water flow was bypassed to original route.

DATE	COMMENT
26 Aug 82 (cont'd)	"A" adsorber water flow rate was increased to 270 gpm to evaluate bumping characteristics in cross section study.
27 Aug 82	New filter assy - sleeve of filter element in #1 pod of west bank was torn at seam.
	"A" adsorber cross section water samples were taken 6" apart at #1 sample port.
29 Aug 82	Six sets of dewatering well water level probes were moved to a new position.
30 Aug 82	Reset heaters in MC panel for P2 sump pump.
	Stonehand Industries picked up five new filter elements (44 Micron).
01 Sep 82	RC well 24 - overflowing; water flow rate was reduced.
	New filter element sleeves (44 Micron) arrived.
02 Sep 82	Adsorber effluent filters replaced.
	New filter assy - installed new filter elements (44 Micron).
	1200 lbs of carbon were transferred to blowcase.
03 Sep 82	4800 lbs of carbon were transferred to "A" adsorber.
	New filter assy unable to cope with onslaught of carbon fines from "A" adsorber.
	New filter assy - Nos. 1, 2 and 5 valves are sticking. Backwash cycle is 10 minutes apart.
05 Sep 82	New filter assy - Nos. 1, 2 and 5 valves are sticking; hand controlled backwash.
07 Sep 82	New filter assy - Nos. 1, 2 and 5 valves are sticking.
08 Sep 82	New filter assy - Upper #2, lower #1, 2 and 5 valves are sticking.
09 Sep 82	Air pressure increased to 90 psi to new filter assy. Nos. 2 and 5 valves are still sticking.
10 Sep 82	New filter assy - Nos. 2 and 5 valves are sticking.
13 Sep 82	Same as above.
	Auxiliary sump overflowed and flooding building. Fail safe switch was operating satisfactorily.

DATE	COMMENT
14 Sep 82	New filter assy - plumbing revised to study element loading.
15 Sep 82	New filter assy - valves #2 and #5 are still sticking.
16 Sep 82	West recharge well breaker tripped; reset.
	Fresh carbon storage hopper filled with virgin carbon.
	New filter assy - evaluation of new filter elements (10, 44 & 100 Micron) was completed.
17 Sep 82	West recharge well breaker tripped; reset.
20 Sep 82	New filter assy was started in operation with 10 Micron elements installed.
	West recharge well breaker tripped; reset.
21 Sep 82	West recharge well breaker tripped; reset.
	Greased sump pumps P1-P5.
22 Sep 82	New filter assy - Nos. 2 and 5 valves are sticking.
24 Sep 82	Two blowcase volumes of spent carbon were replaced with fresh carbon in "A" adsorber.
	"B" adsorber - cross section water samples were taken 6" apart at #1 and #2 sample ports to evaluate effect of bed height.
27 Sep 82	The auxiliary sump float height was adjusted to a lower position.
30 Sep 82	DW wells 19-20 - shut down to allow correction of "Texas crossing". FY 82 total water treated ~ 88,018,100 gallons.
01 Oct 82	New filter assy - filter element sleeves were laundered to clean pores of carbon fines.
	RMA electrical personnel checked west recharge wells; wells are okay.
	DW well 19 - red breaker inside dog house was missing.
04 Oct 82	New filter assy - laundered filter element sleeves; operated satisfactorily. Nos. 2 and 5 valves are still sticking.
10 Oct 82	West recharge well breaker was tripped; reset; retripped.
13 Oct 82	New filter assy - Nos. 2 and 5 valves are sticking.
14 Oct 82	Same as above.
15 Oct 82	Same as above.

DATE	COMMENT
16 Oct 82	New filter assy - Nos. 2 and 5 valves are sticking.
17 Oct 82	Same as above.
18 Oct 82	Same as above.
19 Oct 82	Same as above.
20 Oct 82	Same as above.
21 Oct 82	Same as above.
24 Oct 82	Same as above.
25 Oct 82	Same as above.
	Greased sump pumps P1-P5.
26 Oct 82	Plant was shut down to route piping from effluent manifold to the bog.
28 Oct 82	Plant was restarted at 1400 hours.
30 Oct 82	New filter assy - Nos. 2 and 5 valves are sticking.
31 Oct 82	Same as above.
01 Nov 82	Same as above.
02 Nov 82	Same as above.
03 Nov 82	Same as above.
04 Nov 82	Same as above.
	10 Micron filter element sleeves were laundered. 100 Micron sleeves replaced 10 Micron sleeves.
	Added one quart oil to P1 and P4.
	Work release called in to repair west unit heater and DW wells 8, 18 and 46.
05 Nov 82	DW well 46 and west unit heater were repaired.
07 Nov 82	New filter assy - Nos. 2 and 5 valves are sticking.
09 Nov 82	New filter assy - 100 Micron filter element sleeves replaced with laundered 10 Micron sleeves.
15 Nov 82	Albany International called - new parts to correct new filter assy unit problems will be available by 30 Nov.

DATE	COMMENT
24 Nov 82	Auxiliary sump was full; pumped down.
	"C" adsorber system started up.
29 Nov 82	West recharge well breaker tripped; reset.
	One quart oil added to P1 sump pump.
	P1-P5 sump pumps were greased.
30 Nov 82	The Albany International representative started the renovation on the new automatic backwash filter unit. The lower ball valve seats were replaced with glass reinforced teflon seats.
01 Dec 82	New filter assy - the upper ball valve seats were replaced with glass reinforced teflon seats.
02 Dec 82	New filter assy - Rubel and Hager performed flow rate studies with 44 and 100 Micron filter elements in the unit.
03 Dec 82	New filter assy - flow rate studies were performed with the 10 Micron filter element in the unit.
	"B" adsorbers influent filters were replaced with new filters.
06 Dec 82	New filter assy - Nos. 1, 2 and 6 valves are sticking.
07 Dec 82	The air pressure was increased to the new filter assy. Now four sets of valves are operating satisfactorily.
	Albany International mailed a 100 psi pressure gauge.
08 Dec 82	New filter assy unit - four sets of valves operate at 100 psi pressure. No. 5 lower and #6 upper valves are not operating fast enough for the backwash cycle.
10 Dec 82	New filter assy unit - Nos. 5 lower and 6 upper valve mounting bracket attaching bolts were loosened to relieve stress between ball and seat. All valves are functioning correctly.
13 Dec 82	New filter assy unit - all control valves are functioning correctly.
15 Dec 82	Two blowcase volumes of spent carbon were removed from "A" adsorber.
16 Dec 82	Two and one-half blowcase volumes of fresh carbon were added to "A" adsorber.
	The new filter assy unit was bypassed to avoid a blinding of the filter elements.
21 Dec 82	Auxiliary sump was full. No sump pumps were operating. The sump was pumped down.

DATE	COMMENT
21 Dec 82 (cont'd)	Adsorber effluent filters were replaced with new units.
	Added one quart oil to P1 sump pump.
22 Dec 82	The new filter assy unit was put back on stream.

NORTH BOUNDARY TREATMENT PLANT LOG - 1983

DATE	COMMENT
03 Jan 83	Auxiliary sump was full; sump was pumped down.
07 Jan 83	"A" and "B" adsorbers were bumped.
	New filter assy unit - the 10, 44 and 100 Micron filter elements were evaluated for water flow through one tube.
10 Jan 83	West recharge well breaker tripped; reset.
	Auxiliary sump was full; sump was pumped down.
	New filter assy unit - the 10 Micron filter element was evaluated at various water flow rates.
12 Jan 83	New filter assy unit - the 44 Micron filter element was evaluated at various water flow rates.
13 Jan 83	New filter assy unit - the 100 Micron filter element was evaluated at various water flow rates.
17 Jan 83	West recharge well breaker tripped; reset.
	New filter assy unit - the 44 and 100 Micron filter elements were evaluated at various flow rates through three tubes.
18 Jan 83	New filter assy unit - the 100 Micron filter element was evaluated at various flow rates through two tubes in opposite phase of each other.
	P1-P5 sump pumps were greased.
19 Jan 83	DW wells 25, 26, 27 and 28 - leaking.
	DW well 10 - not operating.
	RC well 9 - feed line was broken below the shut-off valve.
	The plant was shut down for the day.
20 Jan 83	West recharge well breaker tripped; reset.
	RC well 9 - feed line was capped.
	DW wells 19-29 - turned off.
	"A" and "B" adsorbers were made operational.
21 Jan 83	West recharge well breaker tripped; reset.

DATE	COMMENT
21 Jan 83 (cont'd)	New automatic backwash filter assy unit was taken off line and was made ready for shipment.
26 Jan 83	West recharge well breaker tripped; reset.
27 Jan 83	Same as above.
31 Jan 83	Same as above.
01 Feb 83	Adsorber effluent filter elements replaced in west bank. Two unbleached experimental elements were installed in the 1st pod and two bleached experimental elements were installed in the 2nd pod.
03 Feb 83	West recharge well breaker tripped; reset.
07 Feb 83	Sump pumps P1-P5 were turned off to allow recapping of RC well 9.
	With the repair of RC well 9, the sump pumps were restarted.
16 Feb 83	Sump pumps P1-P5 were greased. One-half quart of oil was added to P1 sump pump.
22 Feb 83	The plant was shut down to allow for repairs on the recharge well manifold supply line.
	Work release called in to repair DW wells 25 (broken check valve); 26 (broken bypass valve); 27 (water leak at the flow meter); and 28 (broken bypass and loose check valves).
01 Mar 83	A propane gas leak was reported near east unit heater and exposed electrical wires on the west unit heater was also reported. Both items were repaired.
10 Mar 83	Work release was requested for the back hoe to dig a trench by the recharge well manifold feed line near RC well 18 to permit the manifold line repair.
14 Mar 83	Work release was requested to repair DW well 8 (burned out relay) and RC well 2 (broken electrical line).
18 Mar 83	RC well 1 - transformer was found blown by RMA electrical personnel.
21 Mar 83	Adsorber effluent filters replaced in east bank.
	Recharge well manifold feeder line was trenched near RC well 18.
01 Apr 83	A work order was issued to repair the recharge well manifold feeder line.
18 Apr 83	Recharge well manifold feeder line water leak was corrected.
	All "C" sump system dewatering wells are functional.

DATE	COMMENT
18 Apr 83 (cont'd)	One quart of oil was added to P1 sump pump.
19 Apr 83	Work releases were requested to repair RC wells 1 and 19 (broken inlet ball valve); 20 (broken elbow above "Y" strainer); 34 (broken pipe between flow meter and Gould valve); 2, 4, 7, 35, 36 and 38 (water lines plugged); and 12 (defective coil was found by electrical maintenance personnel).
22 Apr 83	Two blowcase volumes of spent carbon were removed from "A" adsorber.
25 Apr 83	Refilling of "A" adsorber with fresh carbon was completed.
	Maintenance electrical personnel found that there was no electrical power east of RC well 24.
	DW well 26 - water pipe loose in check valve.
26 Apr 83	4000 lbs of fresh carbon was transferred to the fresh carbon storage bin.
28 Apr 83	Two blowcase volumes of spent carbon was removed from "B" adsorber.
	Work releases were requested for DW wells 12 (broken sampling valve); 47 (broken check valve); 49 (broken bypass line); and 52 (broken valve bezel).
29 Apr 83	"B" adsorber fresh carbon feeder line from blowcase to adsorber became plugged during loading operation.
	The plant was shut down to permit repair on RC wells 1 and 19.
01 May 83	Plant was made operational with "A" and "C" adsorber on line. "B" adsorber was kept off line.
03 May 83	"B" adsorber fresh carbon fill was completed and the adsorber was put on line.
	Work releases were requested to repair RC wells 3 (repipe between valves); 6 & 7 (repair leaks); 8 & 9 (replumb and insulate); 32 (repipe between valves); and 33 & 34 (tape insulation).
10 May 83	P1-P5 sump pumps were greased.
	Oil was added to P1 (1 quart); P3 (1 quart); P4 (1 quart); and P5 (1 quart).
	Sump pump P3 has noisy bearings. Sump pump was shut down.
11 May 83	The "C" sump was pumped down.
16 May 83	One quart of oil was added to P1 sump pump.

DATE	COMMENT
16 May 83 (cont'd)	The P3 sump pump electrical lines were disconnected at the pump.
18 May 83	There was a local power outage.
	"B" adsorber motor relay was reset.
23 May 83	Two blowcase volumes of spent carbon was removed from "B" adsorber; and one blowcase volume was removed from "A" adsorber.
24 May 83	The adsorber effluent filter elements were replaced.
	The plant was shut down to aviod destruction of the adsorbers carbon.
	There was no fresh carbon in the fresh storage carbon hopper.
06 Jun 83	The fresh carbon storage hopper was filled from the hopper trailer.
07 Jun 83	"A" adsorber was topped off with regenerated carbon.
08 Jun 83	"B" adsorber was topped off with regenerated carbon.
10 Jun 83	Bomareto Pump and Equipment Company removed the P3 sump pump for repair.
14 Jun 83	All the recharge well strainers were cleaned of foreign matter.
15 Jun 83	Sump pumps P1-P5 were greased.
17 Jun 83	Flowmeter batteries were replaced in RC wells 1-9 and 32-38 by the maintenance electrical crew.
20 Jun 83	RC wells 2 and 24 were turned off to allow the ground soil to dry for the back hoe to operate.
21 Jun 83	Oil was added to sump pumps P1 (1 quart); P2 ¼ quart); Pr (3/4 quart); and P5 (1 quart).
27 Jun 83	Oil was added to sump pumps P1 (1 quart) and P4 (1 quart).
29 Jun 83	East recharge well breaker tripped.
	Electrical power line was repaired east of RC well 24.
30 Jun 83	Adsorber effluent filter elements were replaced.
	"A" adsorber influent filter elements were replaced.
	The electrical power line was repaired between RC wells 18 and 19.
	The plant was shut down to permit trenching operation.

DATE	COMMENT
01 Jul 83	The plant was restarted. The RC wells 18-26 were turned off to allow the ground soil to dry.
06 Jul 83	The repaired sump pump P3 installation was completed except for the wiring.
	One quart of oil was added to P1 and P4 sump pumps.
07 Jul 83	P3 sump pump wiring was completed and the "C" adsorber system was made operational.
	The oil for P3 sump pump was replaced.
08 Jul 83	The wire trenching operation between RC wells 18 and 19 was completed.
11 Jul 83	The trenching operation was started to repair the power line between RC wells 23 and 24.
12 Jul 83	The "A" adsorber was bumped.
	"A" and "B" adsorbers were topped off with regenerated carbon.
	A work release was requested to repair the auxiliary sump fail safe float switch.
15 Jul 83	The auxiliary sump fail safe switch was repaired.
18 Jul 83	East recharge well breaker was tripped. RC wells 22, 23, 24 and 26 were overflowing. The recharge wells water was reduced to eliminate the overflowing condition.
19 Jul 83	Added one quart of oil to P3 and P4 sump pumps.
20 Jul 83	East recharge well breaker was tripped.
25 Jul 83	Two blow case volumes of spent carbon was removed from "A" and "B" adsorbers.
	East recharge well breaker was tripped; reset.
	The plant was shut down to replace "A" and "C" adsorber septa screen sleeves and inspection of "B" adsorber septa.
	Oil was added to sump pumps P1 (1 quart); P3 (7/8 quart); P4 (1/8 quart) and P5 (1 quart).
26 Jul 83	The "A" and "C" adsorber septa screen sleeves were replaced with tight weave types similar to those in the "B" adsorber.
	The "B" adsorber septa screens were inspected for possible defects and were found to be satisfactory.

DATE	COMMENT
27 Jul 83	East recharge well breaker tripped; reset.
	The "A" adsorber was topped off with regenerated carbon.
28 Jul 83	One blow case volume of regenerated carbon was loaded in "B" adsorber.
29 Jul 83	"B" adsorber was topped off with regenerated carbon.
	East recharge well breaker was tripped; reset.
	Oil was added to P4 (¼ quart) and P5 (3/4 quart).
01 Aug 83	East recharge well breaker tripped; reset.
	One quart of oil was added to P5 sump pump.
02 Aug 83	"A" and "B" adsorbers were topped off with regenerated carbon.
03 Aug 83	"C" adsorber was topped off with regenerated carbon.
	RC well 18 was overflowing. The water flow was reduced to eliminate overflow condition.
04 Aug 83	One quart of oil was added to P1 sump pump.
05 Aug 83	RMA security notified us to shut down the plant due to an accident on 96th Street and a First Creek flooding condition.
	P1-P5 sump pumps were greased.
	Oil was added to sump pumps P2 (0.3 quart); P3 (0.9 quart); and P4 (0.8 quart).
08 Aug 83	The plant was restarted.
09 Aug 83	"C" adsorber influent filter elements were replaced.
	Adsorber effluent filter elements were replaced.
	The electrical short between RC wells 22 and 23 was corrected.
12 Aug 83	Strainers were cleaned in recharge wells. Unable to obtain water flows because of line pluggage or nonregistry on flow meter.
	No pump action in DW wells 10, 14 or 19. Work release was requested.
17 Aug 83	Flowmeter batteries are dead in RC wells 28, 29 and 31 and DW well 37. In RC well 31, Gould valve solenoid is not closing water flow line. Work release requests were made to repair and replace batteries.

DATE	COMMENT
17 Aug 83 (cont'd)	One quart of oil was added to P1 sump pump.
18 Aug 83	Work release requests were made to clean the recharge well plumbing.
22 Aug 83	0.9 quart oil was added to P4 sump pump.
25 Aug 83	Oil was added to sump pumps P1 (0.9 quart); P2 (0.5 quart); P3 (0.8 quart); P4 (0.9 quart) and P5 (0.9 quart).
31 Aug 83	One quart of oil was added to P5 sump pump.
09 Sep 83	Oil was added to sump pumps P1 (0.9 quart) and P4 (0.1 quart).
12 Sep 83	Oil was added to sump pumps P4 (0.9 quart) and P5 (0.1 quart).
16 Sep 83	Oil was added to sump pumps P1 (0.7 quart); P3 (0.3 quart); P4 (0.1 quart) and P5 (0.9 quart).
19 Sep 83	East recharge well breaker tripped; reset.
20 Sep 83	Work release request was made to find cause of test recharge well breaker problem.
21 Sep 83	Oil was added to sump pumps P1 (0.3 quart); P4 (0.9 quart) and P5 (0.8 quart).
23 Sep 83	East recharge well breaker tripped; reset.
28 Sep 83	Same.
30 Sep 83	Oil was added to sump pumps (P1 (0.9 quart) and P5 (0.9 quart).
	P1-P5 sump p' ps were greased.
	FY 83 total water treated - 67,090,400 gallons.
03 Oct 83	East recharge well breaker tripped; reset.
07 Oct 83	Oil was added to sump pumps P3 (¼ quart); P4 (½ quart) and P5 (¼ quart).
11 Oct 83	Oil was added to sump pumps P1 (½ quart) and P5 (½ quart).
12 Oct 83	"A" adsorber influent filter elements were replaced.
13 Oct 83	East recharge well breaker tripped; reset.
17 Oct 83	Oil was added to sump pumps P4 (0.1 quart) and P5 (0.9 quart).
26 Oct 83	One-half quart of oil was added to P1 and P4 sump pumps.

DATE	COMMENT
31 Oct 83	One-half quart of oil was added to P3 and P5 sump pumps. East recharge well breaker tripped. The breaker will not hold when reset.